The University of Chicago

OCCUPANCE OF THE EASTERN SEGMENT OF THE MIDDLE OHIO VALLEY

A DISSERTATION SUBMITTED TO THE FACULTY
OF THE DIVISION OF THE PHYSICAL SCIENCES
IN CANDIDACY FOR THE DEGREE OF DOCTOR
OF PHILOSOPHY

DEPARTMENT OF GEOGRAPHY
1940

By
JOHN HENRY GARLAND

Private Edition, Distributed by
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FOREWORD

"Occupance of the Eastern Segment of the Middle Ohio Valley" is based upon field investigation of a part of one of the most important valleys in the United States. The Ohio River has long been of national significance, and its past and present value as a navigable waterway is well known. Railroads and highways traverse parts of its valley. Industrial and commercial cities, as well as rich agricultural land, occupy its valley floor; all are menaced at irregular intervals by flood waters of the river.

The Eastern Segment of the Middle Ohio Valley embraces a hundred mile stretch of the river, its associated valley trough, and the economically tributary uplands. This segment of the Ohio Valley extends approximately from Huntington, West Virginia to Maysville, Kentucky. Because of the size of the area, and especially because of its elongated shape, a variety of types of land use is included. Likewise, this segment of the valley is sufficiently extensive to be representative of some of the problems of the cultural-natural environmental relationships of the entire Ohio Valley.

Most of the data for this study were collected in the field during the spring and summer of 1938. To facilitate the recording of the several patterns of cultural and natural occupance, a unit area system of mapping was employed. The unit in each case was a homogeneous area represented descriptively on the field map. Within the cities, however, block units (the area on one side of a street within a single block) were substituted for the larger rural units. The rural units were mapped on the basis of the dominant kinds of farming economy, and were evaluated as high, medium, or low productive utilization in respect to the proportion of the unit area used. Unit areas in which two-thirds or more of the land was productively occupied were considered to be of high productive utility, those between one and two-thirds were considered to be medium, and those less than one-third productively occupied were considered to be of low productive utility. The types of land use were expressed in order of dominance as tilled crops, hay, pasture, forest, and waste land. Within the cities

the block units were represented according to the occupance type areally dominant. Complete residential, scattered residential, retail, wholesale, industrial, social, and vacant types of land use most conveniently expressed the urban cultural occupance.

The data thus collected, supplemented by materials from various sources, have been organized around an occupance pattern presentation. The entire area, a segment of a larger occupance entity, was broken into four homogeneous divisions, which in turn were divided into smaller entities of varying magnitude. Presentation begins with an over-view of the whole segment; each division then is taken up in turn, beginning with the westernmost one and proceeding up stream in a consecutive manner. The Inner Zone of each division, essentially the valley floor, is considered first, district by district, working upstream. The Tributary and Peripheral zones are then treated, with variations in procedure in keeping with the nature of the areas under consideration. From beginning to end, during the field work and in the preparation of the manuscript, a single point of view has been maintained, which in brief looks upon the culture of the area as the results of the utilization by the human occupance of the relative site and situation qualities of the natural environment.

My appreciation is here expressed for the innumerable individuals who have contributed bits of interesting and valuable information during the period of field work. For the city base maps I am indebted to the City Engineers and others of each city. For the drafting of the final maps I express my appreciation to Messrs. Leland Clover and Arthur Robinson of the Department of Geography, Ohio State University. Of the Department of Geography, The University of Chicago, for the advice and assistance of Professor Henry M. Leppard and Professor Wellington D. Jones, and for the guidance of Professor Charles C. Colby, under whose direction this dissertation was undertaken and carried to completion, I owe my greatest debts, and to them I hereby sincerely express my gratitude.

Cleveland, Ohio
March, 1940

John H. Garland

TABLE OF CONTENTS

	Page
FOREWORD	ii
LIST OF ILLUSTRATIONS	vii
Chapter	
I. OCCUPANCE TYPES AND SUBDIVISIONS OF THE AREA	1
Cultural Features and Activities	3
Distribution of Population	3
Employment of Population	4
Agricultural Economies	5
General commercial agriculture	5
Subsistence agriculture	9
Part-time agriculture	10
Industry and Commerce	11
Transportational Facilities	13
Highways	13
Railroads	16
Water and air transportation and public service	17
Natural Features	18
Valley Bluffs and Dissected Uplands	18
Tributary Valleys	19
Ohio Valley Bottoms	20
Valley bottom floods	21
Floodplains	25
River terraces	26
Preglacial Strath	26
Soils	27
Major Occupance Divisions	27
II. WESTERN RURAL DIVISION	30
Divisional Structure	30
Commercial Economy of the Valley Bottom	30
Districts of the Valley Bottom	31
Maysville-Aberdeen District	33
Maysville Section	34
Aberdeen Section	35
Springdale-Buzzards Roost District	36
Manchester-Trinity District	37
Wrightsville-Pence District	39
Rome-Carrs District	40
Vanceburg-Sandy Springs District	41
Black Oak District	42
Garrison District	43
St. Paul District	43
Subsistence Economy of the Tributary Zones	43
Ohio Section	44

TABLE OF CONTENTS - Continued

Chapter		Page
	Kentucky Section	45
	Subsistence Economy of the Peripheral Zones	45
	Summary	46
III.	CENTRAL URBAN DIVISION	48
	Districts and Economies of the Division	48
	Portsmouth Commercial and Industrial District	49
	Portsmouth	49
	Commercial, industrial and residential valley floor	50
	Residential terrace	52
	Scattered residential terrace	52
	New Boston	52
	Sciotoville	54
	Wheelersburg	54
	Functional Relations	55
	Western Scioto County District	56
	Commercial Agriculture of the Valley Bottom	57
	Scioto Valley Section	57
	Friendship Section	58
	Pond Run Section	59
	Buena Vista Section	59
	Part-Time Farm and Village Zone	60
	Eastern Section	60
	Western Section	62
	Subsistence Economies of the Upland	62
	Fullerton District	62
	South Portsmouth Section	63
	Fullerton Section	63
	Firebrick Section	64
	Summary	64
IV.	EAST-CENTRAL RURAL DIVISION	66
	Divisional Structure	66
	Inner Zone of Commercial Agriculture	66
	Siloam Section	67
	Grays Branch Section	68
	Greenup Section	68
	Pine Creek Section	70
	Haverhill Section	71
	Tributary Zones of Subsistence Economy	72
	Kentucky District	72
	Northern Section	72
	Western Section	73
	Ohio District	73
	Peripheral Zones of Subsistence Economy	73
	Summary	74

TABLE OF CONTENTS - Continued

Chapter		Page
V.	EASTERN URBAN DIVISION.	75
	Industrial and Commercial Economy of the Division.	75
	Inner Zone of Urban Occupance.	76
	Ironton District	77
	Hanging Rock Section.	77
	City of Ironton	77
	Coalgrove Section.	80
	Russell District	81
	Wurtland Section	81
	Raceland Section	81
	Russell Section	82
	Ashland District	83
	City of Ashland	83
	Catlettsburg	88
	Sheridan District.	88
	Chesapeake District	90
	Huntington District	91
	Commercial core	91
	Intermediate zone.	92
	Periphery	96
	Kenova-Ceredo extra-peripheral zone. . .	98
	Tributary and Peripheral Uplands.	99
	Summary	100
VI.	CONCLUSIONS	101
BIBLIOGRAPHY		110

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LIST OF ILLUSTRATIONS

All the figures here listed except Figure 5 are to be found in the pocket attached to the back cover.

Figure

1. Location of the Eastern Segment of the Middle Ohio Valley.
2. Natural Features and Human Occupance of the Eastern Segment of the Middle Ohio Valley.
3. Cultural Occupance of the Eastern Segment of the Middle Ohio Valley.
4. Land Forms of the Eastern Segment of the Middle Ohio Valley.
5. Flood Crests on the Middle Ohio, January 26, 1937.
6. Divisions of the Eastern Segment of the Middle Ohio Valley.
7. Cultural Occupance of Portsmouth, Ohio.
8. Cultural Occupance of Ironton, Ohio.
9. Cultural Occupance of Ashland, Kentucky.
10. Cultural Occupance of Huntington, West Virginia.
11. Types of Agriculture of the Eastern Segment of the Middle Ohio Valley.
12. Corridor Qualities of the Eastern Segment of the Middle Ohio Valley.
13. Urban Occupance of the Waterfront of the Eastern Segment of the Middle Ohio Valley.

CHAPTER I

OCCUPANCE TYPES AND SUBDIVISIONS OF THE AREA

The Ohio River, pursuing its devious course from the junction of the Allegheny and Monongahela rivers to the Mississippi, is composed of three parts. In terms of general direction of flow, both the upper and lower parts pursue a northeast-southwest course, whereas the middle part, the shortest of the three, extends from south to north. In its middle course, therefore, the river flows almost at right angles to its general trend. This being true, the Middle Valley of necessity begins at the apex of a great southward bend of the river and ends at the apex of a great northward bend. Huntington, West Virginia, located on the outside of the first great bend, marks the eastern extremity of the Middle Valley, whereas Cincinnati, Ohio, 180 river miles[1] away at the outside of the second bend (Fig. 1), marks the western extremity. Because of its southeast-northwest trend, and its position in the country, the Middle Valley lies in a direct line between southern Lake Michigan and the entrance to Chesapeake Bay, and, as logically might be expected, is followed by the main line of the Chesapeake and Ohio Railroad and the highway U.S. 52 (Fig. 2). The Middle Valley, therefore, is a corridor of national significance.

The Middle Valley divides into two segments of about equal length. For ninety of the one hundred miles of the Eastern Segment the river flows through the dissected Kanawah section of the Appalachian Plateau (Fig. 1), whereas in the Western Segment of the Middle Valley the river penetrates for eighty miles the rolling surface of both the Lexington Plain and the Central Lowland.[2]

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[1]Distances up and down the valley are measured along the center of the channel and are taken from: Chief of Engineers, United States Army, The Ohio River (5th ed. Recompiled and Revised to June 30, 1934; Washington: Government Printing Office, 1935).

[2]Nevin M. Fenneman, "Physiographic Divisions of the United States," Annals of the Association of American Geographers, Vol. VI (1916).

The trough of the Middle Valley is only about a mile and a quarter wide in the narrowest reaches, and two and a half miles in the widest. In the Eastern Segment steep, rocky valley walls, interrupted in many places by tributary valleys, rise from 300 to 700 feet above the valley floor, whereas in the Western Segment they rise uniformly about 300 feet above the valley bottom. Industrial and commercial cities and market towns stand at close but irregular intervals along the floor of the valley (Fig. 3). Between these urban centers commercial agriculture prevails. In the tributary uplands, however, general commercial agriculture dominates the rolling uplands of the Western Segment, whereas subsistence agriculture, nemoriculture, and saxiculture occupy the slopes and valleys of the dissected uplands of the Eastern Segment. The transition between the Eastern and Western Segments is gradual, but it is accentuated at Maysville, Kentucky, about a hundred miles below Huntington and eighty miles from Cincinnati (Fig. 1). At this point the subsistence agriculture of the hills, which dominates the back country of the Eastern Segment and trickles down the tributary valleys and over the valley walls to mingle with the general commercial agriculture of the valley bottom, narrows to a thin strip along the dissected valley margin. Below Maysville commercial agriculture prevails on the uplands as well as on the valley floor. For this reason, therefore, Maysville is taken as the point of division between the two segments of the Middle Valley. The Eastern Segment, the area of interest in this dissertation, thus extends from Huntington, West Virginia, to just below Maysville, Kentucky, a distance of about fifty river miles both up and down stream from the mouth of the Scioto River (Fig. 2). Laterally, the area extends north and south over the bluffs and up the tributary valleys to some faint and imperceptible zone of delimitation where cultural occupance no longer faces the valley bottom. Physically, it is an area of between 1,500 and 2,000 square miles, consisting of the trough through which the river flows (Fig. 4), the valley bluffs and adjacent uplands, the short tributary valleys, and the lower reaches of the Scioto, Big Sandy and other larger tributaries.

The center of interest in this study of the Eastern Segment of the Middle Ohio Valley is the occupance of the area, especially those features associated with its economy. Cultural features are described and explained in terms of their relation

to the natural environment and in terms of their relation to the segment as a whole. Emphasis also is placed on the recognition and delimitation of the divisional entities of varying magnitude which together constitute the segment.

Cultural Features and Activities

Of first consideration are the cultural features and activities, especially those associated with the economy of the area. The distribution of population, the manners in which people are employed, the regional economies, industrial and commercial activities, and the transportational facilities are of major importance in this respect.

Distribution of Population

Within the Eastern Segment lives a population of about 250,000. Of this total about 185,000 live in cities of 2,500 or more, 25,000 in small towns and villages, and 40,000 in rural areas. Most of the population is confined to the trough of the Ohio Valley, and except for a few hamlets all of the urban population is in the trough (Fig. 3). The back country, therefore, is distinctly rural, whereas the trough has eight cities of more than 2,500, and about fifty villages. Seven of the eight cities are on the valley bottom east of the mouth of the Scioto River, whereas the remaining one, Maysville, is at the western extremity of the segment (Fig. 2). Outside of the cities and towns, population is evenly spread over the valley bottom and terraces of the Ohio, and in the valleys of all but the smallest tributaries.

Within the segment there are four distinct population divisions (Fig. 3) two of which are rural and two urban.[1] One of the rural divisions centers on the western thirty-five miles of the trough, one of the urban divisions encompasses the northern great bend on both sides of the mouth of the Scioto River, the eighteen miles of river bottom above this urban division is occupied by the other rural area, whereas the eastern twenty-seven miles of the segment is occupied by the other urban division.

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[1] A city is here considered to be any incorporated place with a population of 2,500 or more, and an urban area is one in which more than half of the population lives in one or more cities.

Employment of Population

Approximately a third (34 per cent) of the population is gainfully employed. Of this group, about one-fourth (24.8 per cent) are engaged in agriculture and one-fifth (22 per cent) in manufacturing.[1] In the rural divisions over two-thirds of the gainfully employed work on farms, whereas in the urban divisions from a fourth to a half are engaged in manufacturing. A small part of the employed population is engaged in mining (1.6 per cent), forestry and fishing (.15 per cent). Thus, agriculture and manufacturing are the important means of livelihood to most of the people. The economic returns from these activities, however, are not especially large, for less than 2 per cent (1.4 per cent) of the total population, or 4 per cent of those gainfully employed, have an income sufficiently large to require the payment of income tax. Three-fourths of the individuals with incomes large enough to be taxed live in the urban divisions.

Agriculture, the greatest single source of livelihood to the people, is widely spread over the region. In fact, it is an economy matrix through which the other occupations are scattered. On the other hand, manufacturing, the second activity from the point of view of number of people gainfully employed, is limited to small areas within or on the peripheries of cities (Fig. 3), all but one of which are east of the mouth of the Scioto River.

Although corn, wheat, tobacco, pasture, and hay are present everywhere in the agriculture of the Eastern Segment, a variety of agricultural combinations and economies are characteristic. Because of the variety of farming types, marked contrasts in size and nature of the agricultural and other cultural features, as well as in the nature of their functions, is characteristic of the area. The segment lies on the eastern margin of the corn and winter wheat belt, one of the major agricultural divisions of North America.[2] Three regionalized types of farming dominate the agricultural economy of the segment. The western part, especially the

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[1] U. S. Bureau of the Census, Fifteenth Census of the United States: 1930. Population, Composition and Character for Counties, Cities and Townships, Vol. III (Washington: Government Printing Office, 1933).

[2] Oliver E. Baker, "Agricultural Regions of North America," Part III, Economic Geography, III, No. 3 (July, 1927), 309-39.

area south of the river, lies within the burley tobacco and general farming type; the central portion, chiefly south of the river, belongs to the southern Appalachian self-sufficiency type; and the rest is a part of the eastern Ohio general farming type.[1] Nine of the Type-of-Farming areas delimited by the Bureau of Agricultural Economics of the Department of Agriculture[2] lie, at least in part, within the Eastern Segment.

Agricultural Economies

Outside of the cities, with their industrial and commercial activities, three types of rural economies, occupying three quite distinct portions of the area, are characteristic. General commercial agriculture (Fig. 3) dominates the trough of the Ohio Valley, except in the urban districts, and the large tributary valleys, especially the Scioto. Subsistence agriculture (Fig. 3) dominates the dissected uplands, the valley bluffs and most of the tributary valleys. Adjacent to the cities on portions of the Ohio Valley bottom, the terraces, and the bluffs, as well as in tributary valleys, there are districts of part-time economies (Fig. 3) which vary in nature with available employment in the cities.

General commercial agriculture.--General commercial agriculture, as the dominant economy of a large part of the valley bottom and of the rolling upland of the western extremity of the area (Fig. 3), is conducted on farms of eighty to one hundred and ten acres in size. Their occupants, farm families of three to five or more persons, live on them, operate them on a full-time basis, and produce agricultural commodities for sale or exchange. Most of the farms are old, portions of the area have been utilized since the 1790's. Most of the farms are equipped with a brick or frame house of six or more rooms, a moderately large barn in most cases painted, a tobacco dry shed invariably unpainted, an open well, a root cellar, and numerous other buildings. A large part

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[1] U. S. Department of Agriculture, Planning Division--Agricultural Adjustment Administration, Regionalized Types of Farming in the United States.

[2] Types-of-Farming Areas in the United States, 1930. Prepared by the Bureau of Census, Department of Commerce in co-operation with the Bureau of Agricultural Economics, Department of Agriculture.

of the land is occupied by rectangular fields enclosed by woven wire fence on which a corn-winter wheat combination, hay, and pasture dominate. Tobacco, soya beans, other small grains, gardens, orchards and wood lots occupy small areas on most farms. Corn is the conspicuous crop in the landscape in the late summer. Winter wheat shares the same ground with a portion of the shocked corn in the fall and winter and seems to dominate the landscape in the June harvest season. Although a portion of the land of each farm is in pasture, and cattle, hogs, sheep, horses, and mules all are reared, dairying or the rearing of livestock is not an important economic function except in a few widely scattered places. Dairying, in general, is of greater importance near the city districts in the eastern part of the area; other livestock than dairy cows are characteristic of most of the general commercial farming area, with not a few of the animals sold at auction in the markets of Greenup and Vanceburg.

Crop combinations, especially in the valley bottoms, vary markedly with changes in the physical conditions of the land. The frequency of winter and spring flooding is probably the most pertinent condition in this respect. On the floors of the tributary valleys which, because they are incised below the valley bottom of the Ohio, are flooded every spring, corn is almost the only crop grown. In the wider portions of the valley bottom of the Ohio these tributaries flow for a mile or more parallel to the Ohio River in a well-marked depression or sag.[1] These depressions or sags are occupied by strips of floodplain corn and gallery forests. The riverfront is likewise an area utilized almost exclusively by corn, since it also is an area of frequent winter and spring flood. In contrast, the higher bluff-side portion of the valley bottom is occupied by the corn-winter wheat combination, interspersed with tobacco and a few minor crops. Fields utilized by both hay and pasture are indiscriminately scattered over the valley bottoms, although areas of poor drainage are in most cases occupied by permanent pastures.

The land-use of the valley bottom of the Ohio presents a

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[1] Longitudinal depressions or sags are found on all wide portions of the valley bottom of the Ohio irrespective of the presence or absence of tributary streams. Thus a characteristic profile of a wide portion of the valley bottom of the Ohio consists of a low riverfront ridge separated from a low bluff-side ridge by a wide, shallow depression or sag.

characteristic bilateral profile of farmsteads and crop combinations from the river to the bluff. The bank slopes quite rapidly to the river and, except for an occasional strip of corn consisting of a half-dozen or more rows that are frequently washed out by the early summer freshets, the steep slope is hidden by willows and a tangled mass of brush. Broad fields of corn grow on the deep, imperfectly developed, alluvial soil at the top of the slope. There the surface is level, drainage is good, and moisture is abundant, too abundant at times, however, for this is the area that a late spring freshet may inundate a foot or so. Frequently, replanting, or if the season is late, the substitution of soya beans for corn, follows a prolonged freshet. Garden crops, hay, and pasture share a minor part of the riverfront with the corn, and in most places widely separated farmsteads line the riverfront. Excepting the dissected portions of the valley bottom, where woodland, waste, pasture, hay, and intermittent spots of floodplain corn prevail, the agricultural occupance becomes a crop combination as the well-drained surface rises gently towards the valley bluff. Corn and winter wheat dominate interspersed with tobacco, hay, pasture, and the other small grains. There, too, is a second row of farmsteads along the highway at the foot of the bluff.

As is the general practice in the corn and winter wheat belt, where the fall weather is more moist than it is farther west in the heart of the corn belt, corn is cut in the fall and stacked in shocks to cure. When cured the ears are picked from the shock, and the bundled stocks are used for fodder. On the better drained portions of the valley bottom, the shocked corn is lined up in regular, widely-spaced rows, and the land between is seeded to winter wheat. In the spring the wheat sprouts cover all parts of the fields except the strips where the corn shocks stood. These bare strips sometimes are seeded to oats, soya beans, or other grains, or more frequently are left to grow up to weeds. The wheat begins to ripen early in June, and by the middle of the month has been cut and shocked. The rows of yellow wheat shocks on the higher land form a contrasting background to fields of new corn, green meadows, and hay on their lower riverfront fields. Oats and rye occupy a small part in the late summer harvest at which time soya beans are harvested, second crops of alfalfa are put up for hay, and weeds in the winter wheat fields

are cut in anticipation of fall plowing or seeding.

A few special crops utilize small patches of the bottom lands, of which orchards, gardens, and tobacco are the chief ones. Orchards are least important, but like vegetable gardens, supply farm families with food. Tobacco, in contrast, is an entirely different proposition, for each little patch of field produces an important cash crop. In the western part of the area, which lies within the white burley tobacco district of the Blue Grass region, tobacco is especially important.

Early in March in the tobacco area, faint columns of wood smoke fill the valley and streak the forested hills, as the farmers prepare their tobacco seed beds. Wood and brush cut from the woodlands, together with the stalks from previous tobacco crops, are piled in a heap on a small plot of ground in the farm yard, usually a gentle south-facing slope, and burned to destroy the weed seeds in the ground and, incidentally, to add potash to the soil. After the pyre is completely burned, the soil is finely pulverized, and is fertilized. The tiny seeds are mixed with earth before planting to insure even distribution within the seed bed. A log frame is placed around the bed, which is covered with a light cloth to conserve moisture and to protect the young plants from frost. Light colored rectangles of cloth marking the location of tobacco seed frames dot the valley and the adjacent hillsides from early March until about mid-May. At that time the cloth is removed and the pale plants are allowed to strengthen while the field is being prepared. The plants are set out in the fields in rows about two feet apart. The fields are small patches of only an acre or two at the most, and are mostly areas of well-drained pasture that have recently been broken up, perhaps the sod having been plowed under only the fall before. After several years of continuous tobacco cropping fertility declines, and new pastures are plowed up. Exhausted area must be returned to grass for five or six years, or very heavily fertilized. Fields are carefully cultivated and kept free of weeds, and suckers are picked from the leaf stalks upon appearance. About the middle of July the blossoms and a few of the upper leaves are cut from the stalks, and during the last two weeks of August, the crop is harvested. Each plant is split almost the entire length from top to bottom, and is cut down and placed astride a stick stuck in the ground at an angle, to wilt before being placed in the dry sheds to air cure.

The sticks, about four feet in length and sharp at one end, are in most cases hand hewn. After about a month or six weeks in the dry sheds, with the ventilators open in dry weather and closed during rains, the leaves are stripped from the stalks, sorted, tied into "hands" of ten to twenty leaves. These "hands" are sold at the warehouses in the tobacco auction, which lasts for about six weeks each fall in the market towns, of which Maysville, Kentucky, is by far the most important one in the Eastern Segment of the Middle Ohio Valley.

Subsistence agriculture.--Over most of the dissected uplands, along the steep walls of the Ohio Valley, in the minor tributary valleys, and on most of the Ohio Valley terraces except in the areas adjacent to the cities, spreads an agricultural economy based chiefly on self-sufficiency (Fig. 3). It is the typical subsistence hills culture of the "Mountaineer" of eastern Tennessee and Kentucky. The culture has spread over the dissected hills, interrupted only by the commercial economies of the valley bottom of the Ohio, until at the west it finally mingles with the general cash economies of the gently rolling till plains of the Middle West.

Although the farms in the subsistence agriculture areas are about as large as they are in the commercial farming district, the area actually used for crops is very small with, of course, a proportionately low return per acre in farms. Livestock is of little importance, and tobacco and illegal corn whiskey constitute the only sources of income. Farm families are large, whereas the houses in which they live are in most instances much smaller and poorer than those of the commercial farms. As logically might be expected, the amount of money spent per person each year for retail commodities is extremely low, only about a quarter of the yearly per capita retail sales of the commercial farming areas. The houses are small and, in most cases, constructed of logs or locally rough-sawed lumber. A few small out-buildings and an open well are a part of almost every farmstead. The fields are small and irregular in shape; on most farms a large garden patch of corn and a patch of tobacco constitute the cropped area. Partly cut-over forest is a conspicuous feature of the landscape and the evidences of forest utilization are on all sides. Individual differences between subsistence farmers are reflected in their simple habitations, some being neatly kept and freshly painted or

white-washed cabins, others unpainted shacks where the inmates live in filth and squalor.

Part-time agriculture.--Adjacent to the cities, especially the larger industrial ones in the eastern part of the segment, residential districts of part-time agricultural economies (Fig. 3) occupy areas on the valley bottom, along the sides of the bluff, on terraces, and even on the dissected uplands. The part-time farm is small, consisting only of a few acres at the most, on which is a small house, a garage, and on some of them a few small out-buildings. Painted frame buildings are the rule, although there are both log and rough-sawed frame houses among them. Open wells supply most of them with water, and a great black iron kettle steaming over an open fire in the back yard is no unusual sight on wash days. Electricity, telephone service, and automobiles are the only conveniences of living distributed throughout the part-time agricultural areas with any degree of regularity. Automobiles furnish the transportation to the centers of part-time employment, and as might be expected, most of them are not of the latest models. Large gardens, a small patch of corn and tobacco, and a cow or two are a part of each farm. Truck farming, orchards, and chicken raising are of significance in the eastern portion of the area. Part-time farms are small, and in most cases they occupy narrow strips of the valley bottom along the highways, narrow terraces, or narrow tributary valleys. They, in most cases, are so closely spaced that they form well-defined string towns or compact villages. The largest settlement of this type is West Portsmouth, an unincorporated village of 2,500 which occupies a terrace on the west side of the Scioto Valley (Fig. 2). Westward from West Portsmouth an area of part-time agriculture (Fig. 3) occupies the valley bluff and terraces. East of Portsmouth is another small area whereas larger areas of part-time farms occupy the valley bluffs, terraces, tributary valleys, and even the valley bottoms in the Huntington and Ashland districts (Fig. 3). Scattered part-time farms, not in great enough numbers to dominate the area, are found on the opposite side of the Ohio from Maysville, Kentucky, to which they are joined by a bridge. In every case the part-time farms are the residential areas for semi- and unskilled laborers in the factories and in other forms of employment within the cities. The part-time farm provides inexpensive living conditions and even a small cash income, and in

times of industrial unemployment is sufficient for a subsistence existence.

Industry and Commerce

Industry and commerce together make up an especially significant part of the economy of the area (Fig. 3). Since, with few exceptions, the industry and commerce of the Eastern Segment are functions of the cities, towns, and village, the importance of these activities to the economy of the area is obvious when it is noted that over 80 per cent of the population live in the cities, towns, and villages. Twenty-two per cent of the gainfully employed population of the area are engaged in manufacturing centering chiefly in the larger cities of the eastern end of the valley trough (Fig. 3), whereas over forty-five hundred retail units of all types are widely distributed from the largest city to the smallest hamlet. Besides retail establishments there are numerous wholesale plants and agricultural markets. Each of the eight cities of Maysville, Ashland, and Catlettsburg, Kentucky, Kenova and Huntington, West Virginia, and Portsmouth, New Boston, and Ironton, Ohio (Fig. 2) has a well-developed commercial core made up largely of retail establishments. In the intermediate and peripheral zones of the cities, especially along the railroad and the riverfront, are wholesale bulk commodity markets in which sand, gravel, coal, lumber, and scrap iron are bought and sold. Maysville, in the midst of an agricultural district at the western end of the segment (Fig. 2), is outstanding as a tobacco market, and Huntington, at the eastern extremity, is a small tobacco market. The larger cities, especially Huntington and Portsmouth, are important wholesale distributing centers. All of the towns, villages, and hamlets, with the exception of a few agglomerations of part-time farms, have well-developed commercial centers. The larger towns, especially Manchester, Ohio, and Vanceburg and Greenup, Kentucky (Fig. 2) are agricultural market towns in which commercial facilities for the sale of agricultural commodities, with the exception of tobacco, have been set up. Public auctions of livestock are held in Vanceburg and Greenup regularly.

All of the cities and towns, and even some of the villages and hamlets to which the products of the farms, the forests, and the mines of the area could be brought, developed some form of manufacturing at a relatively early date. Some of these indus-

tries persisted and developed into the present industrial economy of the area, whereas others became decadent and disappeared.

The manufacturing of leather goods, lumber and wood products, ceramics and glass, coal products, rolling mill steel products, cement, machine shop and foundry products, non-ferrous metals, explosives, food, and a miscellaneous group of less significant manufactures, constitute the industrial economy of the Eastern Segment. Wood products and ceramics are perhaps the most widely spread throughout the area. Wooden pulleys in Maysville, wooden shoe heels, lasts, and hardwood flooring at Portsmouth, and ready-cut houses at Huntington indicate the extent and distribution of the woodworking industries. All the towns and most of the small villages have had sawmills at some time in the past, as evidenced by the unused old mills in most of them.

Both active and inactive ceramic plants, spread from one end of the area to the other, constitute a distinctive type of manufacturing. At the western extreme in Maysville; at New Boston, Taylor, and Firebrick in the Portsmouth Districts; at Coalgrove in the Ironton District, at Ashland, and in Huntington are ceramic plants (Fig. 2). The plants at New Boston, Coalgrove, and Ashland are large and active, and are a part of the heavy industrial economy of the eastern half of the segment. The plants in Maysville, Taylor, and Huntington are less active, whereas the plants at Firebrick, Kentucky have been dismantled.

Heavy industries dominate the industrial economy from Huntington to New Boston at the center of the Portsmouth District (Figs. 2 and 3). The Chesapeake and Ohio Railroad shops, the making of mine cars and rails, Monel metal, glass and glass products, aquamarine, and cement, and the creasoting of lumber are the heavy industries of the Huntington-Kenova, West Virginia districts. The American Rolling Mills, producing all types of sheet steel and iron, dominate the industrial economy of the Ashland District, whereas the Chesapeake and Ohio car shops and the chemical plants of the King Powder Company and the Du Pont de Nemours Chemical Company constitute the industries of the Russell, Kentucky District a few miles down the valley from Ashland (Figs. 2 and 3). On the opposite side of the river is the Ironton, Ohio industrial district, in which coke, cement, machine shop and foundry products, especially mining machinery and stoves, are the present heavy industries. Blast furnaces, once the dominant in-

dustrial feature of the Ironton District, are no longer active there. The Wheeling Steel Plant, producing sheet steel, wire, nails, drums, and the like, together with a large solvay coke plant and the Peebles Brick Company at New Boston, Ohio in the center of the Portsmouth District (Fig. 2), mark the western extremity of the heavy industrial zone.

A variety of manufactures, less widely distributed, constitutes the remainder of the industrial economy. The manufacture of shoes and leather goods are notable in this respect. Portsmouth is the center of shoes and leather goods in the Eastern Segment, although there are shoe factories in both Vanceburg (Fig. 2) and Ironton. Cotton carpet-warp is spun at Maysville, shoe strings are woven at Portsmouth, and overalls, dresses, and mattresses are made at Huntington. Milk is condensed at Maysville, and flour is milled at Huntington, whereas ice and bakery goods are produced in all of the cities.

Transportational Facilities

The transportational facilities of the Eastern Segment, most of which are in the valley trough (Figs. 2 and 3), consist of surfaced state and national highways, supplemented by innumerable secondary roads; the main lines of the Chesapeake and Ohio and Norfolk and Western railroads, supplemented by several branch lines; and steamboat and barge lines, operating on the Ohio River, the navigation improvements of which are maintained and operated by the Army Engineers. Only the two largest cities, Huntington and Portsmouth, have airports, whereas electricity, natural gas, and telephone service is conducted over most of the area. The corridor character of the Eastern Segment of the Middle Ohio Valley is especially emphasized by the national and state highways and the railroads (Fig. 2) which enter the valley trough by way of major tributary, follow the valley bottom on both sides of the river for most of its course in the Eastern Segment, and leave the area by way of other major tributaries.

Highways.--With the exception of the valley bottom between Maysville and Vanceburg, Kentucky (Figs. 2 and 3), hard-surfaced state or national highways traverse the valley trough on both sides of the river. Between Maysville and Vanceburg, however, the highway continues from one town to the other by way of tributary valleys in the upland since the valley bottom is not wide enough

to accommodate both a railroad and a highway. On the Ohio side (Fig. 2) the highway U.S. 52 traverses the Middle Ohio Valley from Cincinnati to the toll bridge at Chesapeake, Ohio where it crosses the Ohio River to Huntington, West Virginia on its way southward. At Portsmouth the highway U.S. 23 enters the Eastern Segment by way of the Scioto Valley, crosses to the Kentucky side on the toll bridge, and continues along the valley bottom to Catlettsburg, Kentucky where it turns southward in the Big Sandy Valley (Fig. 2). The state highway Kentucky 10 traverses the remaining part of the valley between South Portsmouth and Maysville, Kentucky. Besides the toll bridges at Portsmouth and Huntington, over which two of the highways pass, the parallel valley highways are connected by toll bridges at Ashland, Ironton, and Maysville (Figs. 2 and 3). Also small ferrys, in both the urban and rural districts, link the highway facilities of opposite sides of the river.

From the uplands state and national highways focus on the valley bottom highway system. In almost every case, the upland highway joins the valley bottom in one of the eight cities (Fig. 3). At Maysville two national and three state highways focus on the valley bottom in a semi-radial manner. The national highways U.S. 62 and 68 cross the Ohio on the toll bridge and turn down the valley. Two highways, on opposite sides of the Scioto, enter Portsmouth, whereas state highways enter both the New Boston and Sciotoville sections of the Portsmouth corporate limits. Highways from the upland join the valley bottom system at Ironton, Ashland, Catlettsburg, and Kenova, whereas five highways focus on the city of Huntington. State highways also join the valley bottom system at Greenup and Vanceburg, Kentucky, and Manchester, Friendship, Hanging Rock, and Chesapeake, Ohio (Figs. 2 and 3). In marked dendritic fashion secondary roads enter the valley trough by way of tributary valleys. These roads invariably join the highway corridor at the center of one of the fifty or more villages of the valley trough, whereas other upland hamlets occupy the intersections of the secondary roads.

Although the railroads and the Ohio River navigation services are significant to the functions of the Eastern Segment, especially the urban economic activities, unity of the economies of the area is achieved largely through the highway system. With the exception of a few decadent river villages, the valley bottom

highways pass along the principal street of every city, town, and village of the valley bottom. In many of the towns and villages there is only one street. Thus, all of the cities, towns, and villages are singularly oriented parallel with the river, although they have little real connection with it. In every case the valley bottom highway follows the principal commercial street which is the second or third street from the river. In every city the commercial core centers on the intersection of the valley bottom highway and the upland highways. The business centers of most of the towns have the same highway intersectional qualities, whereas all but the smallest and most decadent of valley bottom villages and hamlets center commercially at the junction of secondary roads with the valley highways. Tiny villages likewise center on the intersections of secondary roads in the upland.

Along the highway, too, are the farmsteads of the agricultural districts. In the upland both the roads and the farmsteads line the narrow valleys of the tributary streams, whereas on the wide valley bottom of the Ohio and its largest mature tributaries a different relationship between the farmsteads and highways exists. Since the floodplains of the mature tributaries are lower than the valley bottom of the Ohio, and are, therefore, more subject to flooding, the highway occupies a bluff-side position, and farmsteads, in most cases of either the part-time or subsistence variety, line the valley bluff-side of the highway. On the valley bottom of the Ohio, however, the farmsteads are arranged in a bilateral manner. The waterfront row of farmsteads, in most cases occupying a low ridge, belong to farms located entirely on the valley bottom, especially those that are not large enough nor so shaped to extend completely across it. The second group of farmsteads are lined up on both sides of the highway at the foot of the valley bluff. These farmsteads are of two classes, and represent three types of land holdings. One group is the commercial farm, and the other is the subsistence farm. The latter is invariably on the valley bluff-side of the road, and represents an attempt to crop the steep slopes and narrow tributary valleys of the valley bluffs. The farmsteads of the former, which are as large as those on the riverfront, are found on both sides of the highway. Those on the river side of the highway, in most cases belong to farms located between the sag and the highway, whereas those on the bluff-side belong to farms with land both on the val-

ley bottom and on the bluff. In the case of the latter the slopes of the bluff are in pasture and woodland. All of the valley bottom is used for crops, pasture, and hay, and the farmstead on the slope enjoys protection from the floods, which menace the valley bottoms. Near the cities part-time farms predominate along the highway both on the valley bottom and on the bluff-side.

Railroads.--The railroads, like the valley bottom highway, pass through all of the cities, towns, and villages on the valley bottom along their routes, although, because of their corridor nature, they are less effective than the highway system in pulling together the economies of the area. Because of the southeast-northwest trend of the railroads, they are the most direct routes from the Appalachian coal fields to the cities of the Great Lakes. Coal is, therefore, the largest single item of freight hauled through the Middle Valley. The most familiar sight on any of the railroads is a long black train of a hundred or more open cars loaded with coal, slowly moving along the flat grade of the valley bottom, while a compensating string of empty cars goes rattling back to the coal fields.

Aside from the arterial nature of the railroads, the through lines, like the national highways of the valley bottom, also serve to unite and unify the economies of the area. Spur lines are transportational feeders of bulky commodities, especially to the industrial and commercial cities and to the Ohio River barge lines. Huntington, Kenova, and Catlettsburg (Fig. 2) are significant railroad cities, for they occupy the eastern gateway to the Middle Ohio Valley through which the Chesapeake and Ohio main line, the Big Sandy Division of the Chesapeake and Ohio, and the Norfolk and Western enter the area. The Ohio Valley Division of the Baltimore and Ohio Railroad likewise terminates there. From Huntington, West Virginia to Russell, Kentucky (Fig. 3) railroad activities dominate the cultural occupance. Railroad shops, car shops, storage and switch yards, belt lines, and round houses in the cities of Huntington, Kenova, Catlettsburg, Ashland, and Russell are ample evidences of the importance of railroads to the urban economies of the eastern end of the area. Portsmouth, at the northern great bend of the Eastern Segment (Fig. 2), is likewise significant as a railroad center, for it is there that branches of the Norfolk and Western leave the valley for the north and for Cincinnati, a branch of the Chesapeake and Ohio crosses

the Ohio River for the north, and a spur of the Baltimore and Ohio terminates.

Besides the two significant railway gateways, spur lines join the valley bottom system in each of the cities and in some of the small towns. A spur line of the Louisville and Nashville from the heart of the Lexington Plain serves Maysville, although it does not connect with the Chesapeake and Ohio in that city. Another branch of the Chesapeake and Ohio, the coal and iron railroad from Winchester, Kentucky, enters Ashland, Kentucky and joins the Chesapeake and Ohio main line there. Another short spur joins the Chesapeake and Ohio main line at Garrison, Kentucky, whereas the Detroit, Toledo, and Ironton Railroad connects with the Norfolk and Western Railroad at Ironton (Figs. 2 and 3). Over these branch lines as well as the main lines, industrial commodities, especially coal and iron, move towards the industrial centers in the valley bottom, to the river for bulk transportation beyond the area, and to other outside areas served by the through railroad lines.

Another evidence of the relation of railroad transportation to the economies of the area is the connection of stations on both sides of the Ohio River. Especially in the western part of the segment, the railroad stations on the Chesapeake and Ohio Railroad on the south side of the river serve both sides, the connections being made by ferry except where bridges cross the river. From Portsmouth to Huntington the cities and towns on both sides of the river enjoy the advantages of both the Chesapeake and Ohio and the Norfolk and Western railroads through ferry and bridge connections.

Water and air transportation and public service.--Steamboat and barge lines extend the entire length of the Ohio River. Although river landings are numerous in the rural districts, there is now little use of the river except by the cities and larger towns, especially those without railroad service, to which sand, gravel, coal and other cheap and bulky commodities are brought.

The two largest cities, Huntington and Portsmouth, maintain air ports (Fig. 3). The Huntington air port is on the valley bottom on the Ohio side of the river, and the Portsmouth field is on the valley bottom below the mouth of the Scioto.

A pipeline conducts natural gas from the West Virginia field to the cities of the eastern part of the valley, in fact,

the eastern-most cities are on the gas field and, therefore, have wells within the city limits. A longer line carries gas out of the valley directly across Kentucky to Cincinnati. Several submerged pipelines, all of them east of Portsmouth, cross the Ohio.

Electric power lines transmit power up and down the valley to the cities and larger villages. Five lines, representing three electric power companies, cross the river on aerial cables as do the lines of two telephone companies.

Natural Features

Of great significance to the Eastern Segment of the Middle Ohio Valley are the features of the natural environment from which and on which the cultural features have been developed. Landforms, soil, climate, in fact, all of the natural equipment of the area constitutes the background to which human and cultural occupance are related.

Landforms are the most conspicuous and probably the most important natural feature. It is to the landforms that the human and cultural patterns are most closely related; from them, too, that the most pressing problems of the area arise, and it is because of the close association of human and cultural features with landforms that areal differentiation is most apparent. Since the Ohio River, in its middle portion, occupies a valley of varied physiographic history, the several features of landform are in sharp contrast with one another. Steep and rocky valley bluffs and dissected uplands, low, flat floodplains of mature tributary valley, continuous, well-drained valley bottoms, terraces, youthful tributary valleys, and bits of a preglacial strath[1] constitute the chief items.

Valley Bluffs and Dissected Uplands

At Huntington, West Virginia, the Ohio River is about a quarter of a mile wide and flows at an elevation of about 500 feet above sea level in a valley trough which averages about two miles in width. At Maysville, Kentucky, one hundred miles downstream, the river is still a quarter of a mile wide, but the valley has

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[1]The abandoned floor of the preglacial Teays River, which lies about 100 feet above the present level of the Ohio, is known as the Parker Strath.

narrowed to one and a quarter miles in width. The elevation of the river is there about 460 feet above sea level. Steep bluffs (Fig. 4), in some cases vertical cliffs of sandstone and shale, mark the limits of the valley trough. With the exception of the western edge of the Appalachian Plateau (Fig. 1), which reaches an elevation of over 1,100 feet,[1] the general level of the upland is between 800 and 900 feet above sea level. From a valley floor of about 500 feet the steep valley bluffs rise an average height of something over 500 feet with a maximum of 700 feet. Between the steep bluffs lies the level, alluvial valley bottom on which the dominant economies of the Eastern Segment have been founded. Numerous tributary valleys pierce the valley walls at intervals of about a mile, whereas more closely spaced are the minor gullies and hollows, which produce a finely serrated sky-line when viewed from the valley below. From the upland a maturely dissected surface extends from horizon to horizon, and even the Ohio Valley itself is scarcely visible among the folds of wooded hills.

Tributary Valleys

Most of the tributary valleys are youthful and rise only a few miles from the brink of the Ohio Valley trough (Fig. 2), although the major openings in the walls are the mature valleys of streams (Fig. 4) rising far out in the drainage basin. Most notable of this group is the Scioto, occupying a valley whose lower portion is equally as large and in many respects the physiographic equivalent of the Ohio. On the Kentucky side (Fig. 2) six major tributaries, spaced at intervals of from four to twenty miles, enter the Ohio. The westernmost one, Cabin Creek, joins the valley about four miles east of Maysville, Kentucky, whereas the next one, Quicks Run, is twenty miles upstream. Salt Lick and the Kinniconick reach the Ohio at Vanceburg and Garrison, Kentucky, whereas the Tygarts and Little Sandy valleys join the Ohio at Taylor and Greenup, Kentucky, and the Big Sandy River forms the Kentucky-West Virginia boundary. Twelvepole Creek, about two miles east of the Big Sandy, and the Guyandot River, nine miles farther east, are the streams entering the Ohio in West Virginia. On the Ohio side (Fig. 2) the broad Scioto Valley divides the en-

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[1] Some of the higher ridges several miles from the valley are over 1,200 feet.

tire area into two fairly equal portions. West of it four unevenly spaced streams, Ohio Brush Creek, Stouts Run, Lower Twin Creek, and Turkey Creek, flow into the Ohio in a decidedly barbed manner. To the east the Little Scioto and Pine Creek converge on the great bend in the Ohio from the north and the southeast. The Little Scioto follows a preglacial strath (Fig. 4) for a few miles in its lower course and joins the Ohio at Sciotoville.[1] The valley of Pine Creek crosses the southern end of the strath about a mile south of Wheelersburg, Ohio, although the stream continues northward across the valley bottom and enters the Ohio at Wheelersburg. The remaining ones, Symmes and Indian Guyan creeks (Fig. 2), are in the extreme eastern part of the area. Indian Guyan enters the Ohio just west of the mouth of the Guyandot River, and Symmes Creek joins it about three miles west of Indian Guyan Creek.

Ohio Valley Bottoms

Within the valley trough of the Ohio as well as its mature tributaries, flat surfaces contrast sharply with the steep faces of the adjacent bluffs. Because of a complex physiographic history, marked differences exist among the several surfaces in respect to their elevations in relation to one another and to the Ohio River. The most extensive are the Ohio valley bottoms.[2] The circuitous course of the Ohio divides the valley bottoms (Fig. 4) into a continuous series of scrolls extending the entire length of the valley. The valley bottoms are essentially level in so far as their inner and outer margins are concerned. In the central portion, however, is a broad sag extending the full length of all but the narrowest scrolls. The outer face slopes sharply towards the river to the place where a line of willows marks the area of more recent deposition. Tributary streams, entering the valley from the surrounding uplands, have cut deep valleys in the alluvium, which, in many cases, follow devious courses the whole length of the scroll before reaching the Ohio. Intermittent drainage, most of which is parallel to the Ohio, also contribute

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[1] The village of Sciotoville is now included in the corporate limits of the city of Portsmouth, Ohio.

[2] The Ohio valley bottoms are well-drained floodplains, averaging 50 feet above the river, in which tributary streams are deeply incised and have developed floodplains of their own.

to the mid-section dissection. A well-drained condition is characteristic, for the bed of the Ohio is cut well below the level of the valley bottom, so the river at normal stage is usually about fifty feet below its surface. A system of locks and disappearing dams, five of which are within the Eastern Segment (Fig. 4), and constant supervision by the Army Engineers are necessary to maintain a minimum channel of nine feet during seasons of low water, yet, floods frequently menace the valley, and in a few instances[1] have been very destructive on the valley bottoms.

Valley bottom floods.--Twenty-two times in the past sixty-seven years, the Ohio River has flooded the valley bottom of the Eastern Segment. For the entire course of the valley, daily observations taken since 1870 by the Weather Bureau, Army Engineers, Geological Survey, and for a time the Signal Corps, show that prior to 1914 the river was in severe flood twelve times, and since 1914 it has experienced four great floods, making a total of sixteen during the sixty-seven year period of record, or one every four years on the average. The criterion for a "severe flood" is taken as a stage of five feet or more above flood stage for a length of the river equal to at least three-fifths of the distance between Pittsburgh and Cairo, and "flood stage" is the gage elevation at which the river begins to overflow its natural banks in the vicinity of the gage. Throughout the Eastern Segment flood stage is reached at about fifty feet.

Technically, the river is considered to be in flood when it reaches the adopted flood stage, but, actually, serious damage is in proportion to the height reached by the waters above flood stage. Thus, on January 27, 1937, a crest of seventy-four-and-two-tenths feet was reached at Portsmouth.[2] A depth of water of twenty-four-and-two-tenths feet at the river edge of the valley bottom, therefore, extended out into the valley to those points twenty-four-and-two-tenths feet higher than the river side of the valley bottom. Since the valley bottom is essentially level, except for the sag, the flood waters covered the entire valley floor.

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[1]The floods of March, 1913 and January, 1937 were the most severe. The latter, which exceeded the former by about six feet in the Middle Valley, is the worst flood on record.

[2]U. S. Department of Agriculture, "The Ohio and Mississippi River Floods of January-February, 1937," Weather Bureau, Monthly Weather Review, Supplement No. 37, p. 3.

This does not imply, however, that an even depth of twenty-four-and-two-tenths feet was maintained over all of the flooded area. In many places the water was only a few inches deep, whereas in others it was considerably deeper than twenty-four-and-two-tenths feet. In the first place, although flood stage, which varies from fifty to fifty-three feet at the several dams, is the level of the valley bottom at that point, all sections of the valley are not the same level. This is especially true where the broad tributaries enter the Ohio in wide floodplains (Fig. 4) cut twenty to thirty feet below the surface of the valley bottom. Likewise, the water was deeper in the sagged middle portion of most of the wide scrolls. Secondly, the flood crest varied from place to place (Fig. 5) above flood level.

Station	Flood Stage	Crest	Altitude	Previous Crest	Date
Dam No. 28	50 feet	69.4 feet	559.6'	63.3 feet	3/30/13
Dam No. 29	51 feet	73.6 feet	556.7'	70.0 feet	3/31/13
Dam No. 30	52 feet	74.6 feet	549.8'	69.8 feet	3/31/13
Portsmouth	50 feet	74.2 feet	545.1'	67.9 feet	3/31/13
Dam No. 32	53 feet	75.5 feet	535.6'	69.0 feet	3/31/13
Dam No. 33	50 feet	75.3 feet	527.9'	68.4 feet	3/31/13

Figure 5. FLOOD CRESTS ON THE MIDDLE OHIO, JANUARY 26, 1937[1]

In the rural areas farmsteads tend to be concentrated either on the riverfront ridge or along the highway on the bluff edge of the valley floor. Therefore, although most of them were inundated, the water was shallower, and the destruction less than it would have been had the distribution been more even over the entire area. Of course, previous floods have long since indicated those areas in which flood waters were most likely to be encountered. Nothing of a permanent nature has been constructed on the floodplains of the tributary streams where they cross the valley bottom, but, because of the deep alluvium, most of them are planted to corn. Late spring or early summer freshets frequently destroy a portion of the crop, but in years of drought they are the impor-

[1] Ibid., p. 45.

tant areas of agricultural production. The floodplain of the Scioto is the most intensively used agricultural area of the entire Eastern Segment, yet a Y-road and a railroad (Fig. 3) on high embankments are the only permanent features there, and they are sometimes under water. Drainage ditches are numerous in this low area, and fences are unknown, especially in the last few miles of the lower course.

Cities and towns suffer much greater destruction than the open country, because, in most instances, low as well as high portions of the valley bottom are included within their limits. In the cities two sections are usually most seriously affected--the waterfront, and the district several blocks from the river. In most cities the riverfront is old and contains decadent forms, remnants of a more prosperous day of river traffic when warehouses, factories, and even fine homes and hotels lined the waterfront. Present day heavy industries have been added to a portion of that district, and rows of poor residences occupy the area nearby. Thus, one of the areas of serious disturbance is a riverfront district of industry and poor homes.

The main business street of the commercial cores of all of the cities and towns occupies the highest portion of the valley bottom and is, therefore, the second or third street parallel with the river. Although the water of most severe floods has covered the commercial cores of all of the cities, with the exception of Huntington in the 1937 flood, and the loss to stocks of goods is tremendous, it is not so great as it might be if these sections were inundated to a greater depth, for there is opportunity to store goods on upper floors and on racks above the level of the water.

Poorer business streets, second-class residential districts, and commercial-residential combinations in most of the cities occupy the lower section of the sag just beyond the commercial core. There, the proportional loss and suffering is great, for the flood waters of the 1937 reached the eaves[1] of most two-story houses and entirely submerged the smaller ones.

Better residential districts occupy the higher margins of the valley bottom, and, in most cities, the urban area extends to

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[1]Although all of the 1937 flood wreckage has been cleared away, many houses have not been repainted, and the level of the water is clearly revealed by the upper limit of badly pealed paint.

terraces (Fig. 3) and even to the upland (Fig. 4) where the best residential sections are located. These upper districts suffer little directly from the flood, except from the lack of electricity, gas, and water, and, of course, indirectly from the commercial and industrial inactivity of the urban area on which their economic position depends.

The proportional amount of damage differs from place to place in the valley in relation to the variations in physical conditions of site and situation. Huntington was least affected of all of the cities in 1937 because the sag in the valley bottom is not well developed, and, since the crest of the flood did not reach twenty feet there, a large part of the eastern end of the city was not inundated. Ironton, Ohio, on the other hand, was one of the cities in which the flood was especially bad. The city occupies most of a narrow part of the valley bottom (Figs. 2 and 4) which has a well-developed sag and is enclosed by a steep valley wall (Fig. 4) through which the only highway to the upland passes in a low tunnel. Because it enters Ironton near one of the tributary streams, the highway, like the one on the valley bottom was under twelve feet of water in two places. It was necessary, therefore, to bring supplies into the town over an old trail which had been used in Civil War times to haul iron ore into the city. At the present time work is going forward on a new road over the valley bluff and through the hills to join the present highway system at Hecla, to provide a flood escape. Also, ten miles of flood wall are being constructed along the riverfront.

The towns of Coalgrove and Hanging Rock (Fig. 2) occupy the upper and lower tips of the Ironton District. Hanging Rock, especially, occupies a dangerous site. There, the valley bottom pinches out against the vertical face of the cliffs (Fig. 4) at a point where the Ohio makes a sharp bend against the valley wall, which caused the full force of the 1937 flood to swing into the town. The village of Buena Vista is in a similar position eighteen miles below Portsmouth. The force of the flood there was strong enough to wash buildings from their foundations, whereas over most of the valley bottom, the deposition of mud and debris was the major damage.

The periodic floods are mighty agents in the redistribution of wealth, or more truly, of poverty of the valley bottom. The variety of materials collected from place to place over the

valley during and after a flood is surprising. The quantities of food, clothing, medical supplies, boats and motors, tools, and other materials that are sent in as emergency relief measures are enormous. It is the poor, especially those in urban districts, who are driven from their homes. To many of these people, however, a flood has its bright side, for it sometimes takes on the nature of an adventure, the details of which are a train ride to some city removed from the flooded area, warm clothes, good food, warm living quarters, and then, after the water has subsided, a train ride home to the heart-sickening job of cleaning up the mess with a childish faith or at least hope that it will never happen again.

Floodplains.--The major tributaries, in their courses across the valley bottom of the Ohio, have developed floodplains (Fig. 4) that are from twenty to thirty feet lower than the valley bottom, and are, therefore, areas of frequent flood when contrasted with the neighboring higher land. In the broad valley of the Scioto (Fig. 2), which is generically a part of the preglacial progenitor of the Ohio,[1] the floodplain is developed to its greatest extent. An arm of the Ohio valley bottom extends up the west side of the Scioto Valley for about seven miles (Fig. 4) to a point where a major arc of the Scioto reaches its valley wall. In the lower half dozen miles of its course, the Scioto meanders through a floodplain on the left side of its valley, which is about a mile wide. The river is incised in a surface that is essentially flat and is markedly lacking in tributary drainage lines. Because of its complete agricultural occupance, the plain, in early summer, stands out as a green sea of corn and as a great muddy river in flood time.

Well developed floodplains of all the mature tributaries dissect the valley bottom of the Ohio. The floodplain of the Little Scioto (Fig. 2) is extensive, and, since it joins the Ohio at a point where steep and rocky bluffs closely front upon the river (Fig. 4), the contrast between the low, flat valley floor and the adjacent rocky walls is especially sharp. Aside from the valleys of the Scioto and Little Scioto, extensive floodplains extend well back into the Ohio drainage basin (Fig. 4) along the

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[1] W. G. Tight, "Drainage Modifications in Southeastern Ohio and Adjacent Parts of West Virginia and Kentucky," Department of the Interior, U.S.G.S. Professional Paper No. 13, pp. 33-34.

valleys of Ohio Brush Creek, the Kinniconick, the Tygarts, Little Sandy, Pine Creek, Symmes Creek, the Guyandot, and the Big Sandy (Fig. 2). In the smaller mature valleys the floodplains extend short distances beyond the valley wall.

River terraces.--At irregular intervals along the valley walls are discontinuous terraces, which are, in general, from forty to sixty feet above the valley bottom. Both sides of the lower Scioto Valley are flanked with them, large crescentic ones on the right, and a long, narrow one on the left side of the valley. Long, narrow terraces (Fig. 4) continue down the Ohio Valley from the mouth of the Scioto as far as Turkey Creek (Fig. 2). On the Kentucky side of the valley two crescent-shaped terraces extend from three to five miles on both sides of the Tygarts Valley, whereas a large, dissected one stretches up the valley for about five miles above the Kinniconick. At the sharp Sandy Springs Bend are two terraces, the larger of which is on the Kentucky side (Fig. 4). Also, there is a small terrace at Manchester, Ohio, and another at Maysville, Kentucky.

Preglacial Strath

In the eastern half of the area at an elevation of about one hundred feet above the Ohio valley bottom is a series of broad terraces, remnants of a valley floor of preglacial drainage, known as the Parker Strath.[1] Sections of the strath (Fig. 4) are found on the left or east side of the Scioto Valley, and on both sides of the Ohio above the mouth of the Tygarts (Fig. 2). The preglacial Teays River system, which produced this extensive series of high terraces, had its source somewhere in the Appalachian Plateau and joined the present Ohio Valley about at the Guyandot River (Fig. 2), at a level about a hundred feet above it.[2] Just above the mouth of the Big Sandy (Fig. 2) the Teays Valley (Fig. 4) pursues a course parallel to the Ohio on the Kentucky side for about twelve miles, to a point where the two valleys join again. Near Wheelersburg, Ohio the Teays Valley leaves the Ohio and pursues a separate course northwards to the drift border. Numerous streams cross the strath. The Little Scioto enters the Teays Valley, fol-

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[1]Wilbur Stout and G. F. Lamb, "Physiographic Features of Southeastern Ohio," The Ohio Journal of Science, XXXVIII, No. 2, 59.

[2]Ibid., pp. 62-64.

lows it for a few miles, and then leaves it from the opposite side in a short cut to the Ohio (Figs. 2 and 4). The Guyandot also follows the Teays Valley for a ways in West Virginia and likewise abandons it for a shorter course to the Ohio. In Kentucky several short tributaries of the Ohio cross the old strath. The major tributary of the Teays, the Manchester or Portsmouth River, had its source near Manchester, Ohio (Fig. 2). It flowed eastward along the present course of the Ohio, as the barbed tributaries indicate, and up the Scioto Valley (Fig. 4).

With the advent of glaciation the outlet of the Teays system was blocked to the north. The impounded rivers filled their valleys, deposited beds of fine silts high above their previous channels, and cut new courses through low cols. At the close of the Glacial Period nothing was left of the Teays system but a series of broad terraces, whereas the Ohio was left essentially as it is today.

Soils

The landforms and soils of the Eastern Segment correspond to a degree. Deep alluvial soils with little or no profile development cover the valley bottoms, stony and rocky ground with light soil mantle occupies the steep slopes of the valley and much of the eastern uplands, whereas mature gray-brown podzolic[1] soils with the well-developed profiles mantle portions of the uplands. Since the area lies within the long summer variety of humid continental climate, brown forest pedalfers predominate,[2] and, although the original forest cover has long since been removed, second growth deciduous forest has spread a fairly dense cover over much of the upland, especially the ridges.

Major Occupance Divisions

The occupance of the Eastern Segment of the Middle Ohio Valley is composed of four contrasting though closely related di-

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[1] U. S. Department of Agriculture, Soils and Men, Yearbook of Agriculture (Washington: Government Printing Office, 1938), pp. 1033-52.

[2] C. F. Marbut, Soils of the United States, U. S. Bureau of Agricultural Economics Atlas of American Agriculture, Part III, Plate 5. secs. 7 and 8.

visions. Cultural differences provide the basis of recognition of the four divisions. It is chiefly because the contrasting cultural elements occupy essentially similar natural environmental conditions of the valley that regional unity exists. The area is a sharp east-west trough occupied by commercial and industrial cities, part-time farms, and commercial agriculture flanked by a maturely dissected, forested upland of subsistence agriculture, nemoriculture, and saxiculture. As the most direct route between the mouth of the Chesapeake Bay and the southern Great Lakes, this segment of the Ohio Valley is occupied in part by the Chesapeake and Ohio and by the Norfolk and Western railroads, and as a consequence its unity is strengthened. In two of the four occupance division, a majority of the people live in cities and are engaged in commercial and industrial activities, whereas in the other two division rural population and commercial agriculture dominate. The two urban and the two rural occupance divisions are designated (Fig. 3) as: the Western Rural Division, the Central Urban Division, the East-Central Rural Division, and the Eastern Urban Division. It is with the details of the major occupance division, briefly characterized in following paragraphs, that the remaining chapters of this dissertation are concerned.

The Western Rural Division (Fig. 6), which is the largest, lies on both sides of the Ohio River, extending eastward a distance of thirty-five miles from the western limit of the segment to just beyond the Sandy Springs bend on the Ohio side, and a distance of fifty miles on the Kentucky side to the village of Firebrick. A relatively small population occupies the commercial farms, agricultural hamlets and villages, and the few larger towns of the valley bottom, whereas a similarly small number of people live on the little subsistence farms on the steep valley bluffs and the adjacent dissected uplands.

The Central Urban Division (Fig. 6), which lies chiefly on the Ohio side of the river, includes the cities of Portsmouth and New Boston in Ohio, and a group of towns directly across the river in Kentucky. On the east the division extends to and includes Wheelersburg, Ohio, whereas on the west it joins the first division at the Sandy Spring bend twenty-eight miles away. The Kentucky portion includes only about seven miles of riverfront. The majority of the people of the division lives and works in the towns and cities. In addition, however, a rural population, living

on both commercial and part-time farms, occupies the valley bottom outside of the cities, and scattered part-time as well as subsistence farms occupy the valley bluffs and upland. Portsmouth and New Boston, essentially a single urban area, dominate the division. Portsmouth is the commercial center, but shoe factories claim the greatest part of the gainfully employed population of the city. New Boston is an iron and steel and ceramic industrial center.

The East-Central Rural Division (Fig. 6) includes the territory on both sides of the river, from Wheelersburg to Hanging Rock on the Ohio side, from the inside of the great bend of the Ohio at the mouth of Tygarts Creek to Riverton on the Kentucky side. In a manner similar to that of the Western Rural Division, most of the people operate commercial farms on the valley bottom and subsistence farms on the valley bluffs and the uplands. At fairly regular interval are market towns and villages. Greenup, the county seat of Boyd County, Kentucky, is the largest town in the division.

The Eastern Urban Division (Fig. 6) occupies the eastern twenty-seven miles of the segment. By far the largest part of the population of the Eastern Segment of the Middle Ohio Valley live in this division. Although towns and cities line both sides of the river, the urban population is much greater on the south side in Kentucky and West Virginia than it is in Ohio. Manufacturing and commerce dominate the activities of the cities of Huntington, Ashland, and Ironton. Iron and steel, ceramics, and woodworking are the leading industries. Outside of the cities and towns are stretches of part-time farms, as well as a few commercial farms. Railroad yards and certain types of dangerous industries (explosives, chemicals, and oil refining) also occupy area outside of the cities. The cities tend to be offset so that villages or quite open agricultural lands occupy the opposite shores from the cities, to which they are attached by toll bridges. Although in several places the urban development of the valley bottom ascends the steep valley bluffs, and even spreads out on the adjacent upland, subsistence agriculture and nemoriculture occupy most of the valley bluffs and adjacent uplands, much as they do elsewhere in the Eastern Segment of the Middle Ohio Valley.

CHAPTER II

WESTERN RURAL DIVISION

Divisional Structure

The Western Rural Division of the Eastern Segment of the Middle Ohio Valley (Fig. 6) is composed of five parallel zones of occupance. The middle or Inner Zone, the functional center of the division, is the valley floor (Fig. 4). There a commercial economy (Fig. 3) of general mixed agriculture is related to the well-drained, flat, alluvial valley bottom. Large farmsteads, cropped land, hay fields, pasture, and woodland, together with agricultural market towns and rural hamlets, characterize the landscape. On each side of the Inner Zone is a narrow tributary strip (Fig. 6) of subsistence economy, chiefly agricultural and nemoricultural. These strips follow the steep valley walls in thin, ribbon-like traces, widening out on some of the dissected terraces, and reaching out along the narrow tributary valleys like long gnarled fingers. Beyond the valley rim on both sides of the river are Tributary and Peripheral zones (Fig. 6) of subsistence agricultural and nemoricultural. These zones extend back from the valley walls through a dissected upland to that indefinite line of demarcation where the inhabitants no longer face the valley bottom. The outer limits of the division in the western part of the segment swing in towards the valley, for the subsistence economies of the slopes and valleys of the dissected Appalachian Plateau give way to the more productive general commercial agriculture of the till plains of the Interior Lowlands.

Commercial Economy of the Valley Bottom

A cash economy of general mixed agriculture dominates the Inner Zone, for it is there that the greatest relative advantages are found for an agricultural régime. The surface of the Inner Zone is level in an area where steep slopes predominate; the soil of these bottom lands is deep and alluvial amid thin-soiled, eroded hills; the bottoms are moist and well-watered when the

neighboring slopes are parched and dry; and the bottoms are high[1] enough above the tributary streams, to be well-drained when the slopes and floors of the tributary valleys are deluged. On those occasional springs, however, when continued abnormal precipitation falls on the frozen ground and melting snows of the drainage basin, the Ohio brings disastrous floods to its valley floor.

Characteristically, the agriculture of the Inner Zone is of medium[2] productivity. The small areas of exception are of a low rather than of a high degree of productivity. Market towns and agricultural villages occupy the valley bottom at intervals of a few miles, connected on the Ohio side by a federal highway, and on the Kentucky side by a state highway and Chesapeake and Ohio Railroad (Fig. 3). Tilled crops, hay, pasture, woodland, and wasteland constitute the land-use combination. From district to district, however, the details of the combination vary with the quality of the land and the skill with which the land is used. Tilled crops hold first place throughout the entire zone, although the actual amount of land so used varies from district to district. Woodland is especially abundant at the western end of the division on the Ohio side, and at the eastern end on the Kentucky side. In both of these areas woodland is exceeded in amount only by tilled crops. Waste land is second to cropped land at the eastern extremity on the Ohio side. In the eastern and western extremities on the Ohio side tilled crops are outstanding, forest and unused areas are abundant, and hay and pasture lands are of little significance. In contrast on the Kentucky side cropped land, hay and pasture, and forest and waste land are about evenly distributed; throughout the division cropping, as on the Ohio side, is the dominant land-use everywhere.

Districts of the Valley Bottom

The Inner Zone of the Western Rural Division extends, as was pointed out earlier, from the western extremity of the Eastern Segment upstream for about fifty miles. The first thirty-five miles occupy the valley floor on both sides of the river,

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[1] At normal stage the river is 50 feet below the average level of the valley bottom.

[2] Between one-third and two-thirds of the area is in active productive agricultural utilization.

but the upper fifteen occupy the Kentucky side only (Fig. 6) for the trade area of Portsmouth, Ohio reaches down the valley along the highway, definitely tying that side to the Central Urban Division. The federal highway extends the length of the zone, focusing the trade on the market town of Manchester (Fig. 6) just below the mid-point of the Ohio side of the valley. On the Kentucky side a state highway traverses only the eastern and western portions of the valley bottom (Fig. 3). The market towns of Vanceburg and Maysville are connected, however, for a state highway extends from one to the other by way of the upland (Fig. 3). This is logical in view of the fact that the shortest distance between the two points is across the upland. Most of the area between the two towns, both valley bottom and upland, is connected by unsurfaced roads with Vanceburg (Fig. 2). All three of the market towns are situated at focal points where roads from the upland join the valley bottom highway system. They are, therefore, in a position to dominate the trade not only of the valley bottom but also of a large part of the adjacent upland. As has been stated, the main line of the Chesapeake and Ohio Railroad follows the valley bottom on the Kentucky side. In addition to the market towns, local areas are served by stations maintained by the railroad at intervals of about two-and-one-half miles. Most of these stations are in small villages, but a few are not even in hamlets. The function of these stations is to serve the area on both sides of the river. Connections across the Ohio are made by small ferrys. Along the highways, which follow the contact of the valley floor with the valley walls, there is an interesting intermingling of commercial and subsistence economies. Commercial economies not only characterize the valley floor but extend to terraces at Maysville, Manchester, and Sandy Springs (Figs. 4 and 6), whereas part-time and subsistence economies characterize small portions of the valley floor, especially in the district of Garrison, Kentucky (Figs. 3 and 4).

The Inner Zone is composed of nine distinct districts. The first six, in an upstream manner, occupy both sides of the river, whereas the upper three districts are on the Kentucky side only (Fig. 6), for the opposite side of the river lies within another division of the valley. Each district is a physical entity made up of valley floor sections and associated terraces. The sections are due to variations in the width of the valley trough

and the sinuous course of the Ohio in relation to it. There are fifteen sections in all in the Western Division, seven on the right and eight on the left side of the river. Because the river has well-developed bends and is flowing in a trough with very definite valley walls, the sections are markedly crescent-like in shape. The river margins are, therefore, either concave or convex, as the case may be. Within each open bend of the river is a definite physical area. As might be expected in an area that is distinctly agricultural, the cultural occupance of each section is homogeneous. For this reason, as well as because of the marked physical entity of each section, each is recognized as an occupance section of the Western Division. Where the cultural activities of sections on opposite sides of the river are tied together, the related sections are treated as constituting districts of the Inner Zone. The Aberdeen[1] Section on the Ohio side and Maysville (Fig. 6, Secs. 1 and 2 of the Inner Zone--Sections of the Western Rural Division) Section on the Kentucky side of the river mark the western end of the division. Upstream from Aberdeen are the Buzzards Roost, Manchester, Wrightsville, Rome and Sandy Springs sections on the Ohio side, and Springdale, Trinity, Pence, Carrs, Vanceburg, Black Oak, Garrison, and St. Paul sections above Maysville on the Kentucky side. The first six sections on both sides of the river constitute six of the districts of the Inner Zone; the remaining three districts are composed of single sections on the Kentucky side of the river.

Maysville-Aberdeen District

The Maysville-Aberdeen District is the westernmost part of the Inner Zone. On the Kentucky side on the outside of a bend in the Ohio is the market town of Maysville, and on the inside of the same bend on the Ohio side is the decadent river town in the agricultural section of Aberdeen (Fig. 2). The westernmost sections are small for the bends of the river in the Western Division decrease in size with distance downstream; and, since the valley trough narrows in the same direction, the cultural continuity of the zone is interrupted, first on one side and then on the other,

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[1]For convenience, divisional sub-regions--districts and sections--are named for the largest town within their limits. Lacking that, the name of a stream or some other prominent physical feature is used.

by the steep face of the valley bluff.

Maysville Section.--The Maysville Section (Fig. 6, Sec. 2 of the Inner Zone--Sections of the Western Rural Division) is very narrow and, with the exception of the eastern part, is completely occupied by the city. Limestone Creek (Fig. 2), following an extremely short course down the valley wall and across the valley bottom, divides it into two unequal parts. The longitudinal pattern of the city is divided, therefore, by the creek into an eastern and western part, which are connected by only one bridge.[1] The major axis of the city parallels the river on the valley bottom, whereas a residential portion occupies a narrow terrace and lower bluff slopes and even straggles up the face of the bluff to the very top. The Chesapeake and Ohio Railroad enters and leaves the town on the valley bottom, whereas the Louisville and Nashville Railroad and five major highways converge on the valley bottom from the south in a semi-radial manner, chiefly by way of narrow tributary valleys. All of the highways lead to the point in the central core where the toll bridge crosses the Ohio River. This bridge across the Ohio, therefore, is the center of interest in the transportational pattern of the district. Throughout the city an air of prosperity is expressed by the well-kept old buildings: a condition due to the position of the city as an agricultural market for an area much more extensive than the valley bottom zone. Tobacco is an important cash commodity, as is indicated by many large warehouses scattered throughout the eastern end of the city.

Both the age and the situation of the city are significant conditions in the Maysville area. The city was laid out in 1787 on the Ohio valley bottoms just below the mouth of Limestone Creek. Early roads focused on the town because of its river connections. In the early 1800's, the Flemingsburg Pike, now a state highway, was built from Flemingsburg, Kentucky to Maysville by way of Limestone Valley. More roads were constructed later so that the city is now the focal center of a semi-radial pattern of highways which reach out into a wide area in the adjacent portions of Kentucky. Thus, the town was prepared at an early time to receive the tobacco, hemp, and cattle of the adjacent agricultural lands. Although the other commercial commodities have

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[1] At the present time two more bridges are under construction.

largely disappeared from the Maysville scene, the position of the city as a tobacco market has steadily increased, until today large tobacco warehouses are the most conspicuous cultural features of the district. The Chesapeake and Ohio Railroad, built through the towns along the Ohio valley bottom, gave to the tobacco market direct railroad connections with the important tobacco manufacturing districts of the Carolina Piedmont and Kentucky Bluegrass. The most recent step in the development of the focal position of the Maysville area was taken in 1931, when the Kentucky State Department of Highways opened the toll bridge across the Ohio River. The bridge extends from a point on a terrace, where all five of the radial highways focus, to the valley bottom highway U.S. 52 at Aberdeen, Ohio (Figs. 2 and 3). New focal significance is thus given to Maysville, for the toll bridge is the only highway crossing of the Ohio between Portsmouth and Cincinnati.

Aberdeen Section.--Below Maysville on the opposite side of the Ohio, the complementary section, the Aberdeen crescent (Fig. 6, Sec. 1, Inner Zone--Sections of the Western Rural Division), extends for six miles along the inside of the open bend in the river. The village of Aberdeen is situated about in the middle of the bend. Most of the town, consisting of two streets parallel to the Ohio, is on a narrow part of the valley bottom, whereas the rest straggles up the bluff along a minor tributary. The waterfront street is four blocks long and, with the exception of a sand and gravel wharf and an old ferry, is an area of vegetable gardens alternating with refuse dumps. The other street is adjacent to the bluff and is the route of the highway U.S. 52, as well as the center of the town's few service functions. Most of the buildings are old, many of them need repair badly, and many are vacant. It is evident that the center of activity has shifted from the riverfront with the decline of river transportation. All that remains now is a decadent river town within the service area of the city of Maysville across the Ohio River.

Below the village the crescent widens into a broad, flat valley bottom of general commercial agriculture of a medium degree of intensity. The highway traverses the middle of the section, since a small tributary has eroded its course along the foot of the bluff to the lower point of the crescent before joining the Ohio. Therefore, the farmsteads are scattered along the highway in the middle of the section rather than along the outer and

inner margins in the usual manner.

Above Aberdeen for about two miles, the section narrows to a thin strip along which the highway pursues a graded course. The river side of the strip is steep, but nevertheless a score or more of small houses are built on it. Most of them are poor; a few seem to be summer cottages; little land is cropped and patches of corn and gardens dominate that. Since most of these farms, some of which are of the part-time variety, are below the road, access to them is gained down very steep lanes. In a few cases garages at the highway level indicate the interest of the owners in the distant job which supplies them with cash income.

Though not as well developed as it is in other portions of the Eastern Segment of the Middle Ohio Valley, especially in the urban divisions, the part-time farming portion of the district, together with the village of Aberdeen, represent a bridgehead trans-Ohio relationship. The toll bridge reaches the highway on the Ohio side just east of Aberdeen about midway between the village and the part-time farm district. Therefore, no one has more than three miles to go and a minimum toll to pay to reach Maysville. The toll charge for an automobile is forty cents, although a bridge bus makes regular trips back and forth for ten cents per passenger. Residents of the village and the neighboring part-time farms, both on the valley bottom and on the valley bluffs, supplement their livelihood by occasional work in the town across the river, and by the sale of small lots of tobacco there. The bridge also is the factor which allowed Maysville to become the shopping center for the Aberdeen Section.

Springdale-Buzzards Roost District

On the east the Maysville-Aberdeen District joins the Springdale (Fig. 6, Sec. 3 of the Inner Zone--Section of the Western Rural Division) Section. The section is penetrated by the mature valley of Cabin Creek. On the inside of the bend is the Buzzards Roost Section (Fig. 6, Sec. 4 of the Inner Zone--Sections of the Western Rural Division). The highway follows the bluff-side of the Buzzards Roost valley bottom, and is about fifty feet higher than the river, whereas the Chesapeake and Ohio Railroad occupies a narrow bench about forty feet above the river at the foot of the bluff on the Kentucky side. Farmsteads are well distributed over the wide valley bottom. Long lanes, along which

the farmsteads are distributed, cross the valley floor from the highway. There are more farmsteads along the riverfront than along the highway. There is little waste land, and pasture, hay, and pastured woodland, on which sheep as well as cattle are fed, are important, especially in the more dissected western portion.

The Inner Zone qualities disappear entirely, except for the railroad, on the wooded slopes of the Springdale side of the valley. A few scattered subsistence farms cling to the slopes above the railroad, and the little village of Springdale sits in a corner of the valley of Cabin Creek where the railroad crosses the tributary valley. At the Springdale bend and again at the Manchester-Trinity bend, the Ohio approaches so closely to the valley bluff that there is not enough room for both a road and a railroad without a costly job of engineering in the preparation of the necessary grades. Since the Chesapeake and Ohio Railroad follows a grade on the valley bottom on the Kentucky side of the Ohio all the way from Huntington to Cincinnati, it uses the narrow bench at the foot of the bluff on the Springdale and Trinity bends to the exclusion of a valley bottom road. Instead, the highway on the Kentucky side leaves the valley at the eastern extremity of the Maysville Section and goes directly up to the upland two-and-one-half miles away by the way of a short tributary valley. The road barely crosses a corner of the rolling upland and then descends again along the valley of Salt Lick Creek (Fig. 2) to the Ohio valley bottom at Vanceburg. Irregular, poorly-graded, dirt roads[1] from the upland reach the little villages on the Ohio valley bottom by way of tributary valleys.

Manchester-Trinity District

Each arc of the river in the Western Rural Division is approximately six miles long, for the entire fifty-two-mile reach is composed of nine bends. The Manchester-Trinity (Fig. 6, Secs.

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[1] In this section, as well as in other portions of the valley where the river flows almost directly west, roads on the Kentucky side are harder to maintain along the foot of the bluff than they are on the Ohio side, in part because of the greater amount of moisture and lack of direct sunlight on the north-facing bluff. There is a noticeable difference in many conditions, especially in the vegetation, between the sunny south-facing slopes of the Ohio side and the shaded, damp north-facing slopes of the Kentucky side.

5 and 6 of the Inner Zone--Sections of the Western Rural Division) bend extends from the diagonal termination of the Springdale Section to the Manchester Islands six miles farther upstream. Each section has a wide and a narrow part. On the Kentucky side the wide portion of the Trinity Section is downstream, whereas on the Ohio side in the Manchester Section the reverse holds true. On the Kentucky side the railroad traverses the center of the wide bottom. The little village of Trinity fills the mouth of Crooked Creek (Fig. 2) Valley, and the road, entering the valley bottom by way of the tributary valley, parallels the railroad down the center of the section. Short lanes, normal to the road, at the ends of which are characteristic valley bottom farms, extend in both directions. At the upper end of the district is the railroad station of Trinity, connected by ferry with Manchester, Ohio, a town of 2,000 without a railroad. Above Trinity station the Chesapeake and Ohio Railroad is the only cultural feature on the steep, wooded valley bluff.

The Ohio component, occupying the outside of the open bend, is of course opposite in physical pattern. The highway and a few farmsteads, with fields of corn extending all the way from the highway to the river, utilize the downstream narrow portion of the section, whereas the town of Manchester (Figs. 2 and 3) occupies the greater part of the wider upstream portion. Like Maysville, Manchester is an agricultural market for the valley bottom, as well as for a portion of the upland to which it is attached by a semi-radial pattern of roads. In a manner characteristic of river bottom towns, the second street from the river is the commercial center and also the route of the valley bottom highway U.S. 52. The riverfront street, which displays ample evidence of past commercial and industrial activities, is now in a pathetic state of decadence. With declining river transportation, the town, founded in 1791, has been able to maintain its function of agricultural service center without the benefit of a railroad. Its position at the focus of a semi-radial pattern of roads has been significant in this respect. A ferry to the railroad station at Trinity, Kentucky, and a wharf to accommodate sand, gravel, coal and a few other bulky commodities, are the only remaining connections with the river. The commercial center and the older residential portions of Manchester were inundated during the flood of January, 1937. The newer portion, however,

occupies a small terrace and was above the level of the flood.

Wrightsville-Pence District

From the Manchester Islands to Brush Creek Island is the Wrightsville-Pence District (Fig. 6, Secs. 7 and 8 of the Inner Zone--Sections of the Western Rural Division), consisting again of a narrow and a wide valley bottom on each side of the bend. From Manchester the highway on the Ohio side runs along the narrow valley bottom, below which are little strips of corn and hay and the usual fringe of willows along the water's edge. The narrow portion of the section is only two miles long. Since the valley widens with distance upstream, the bends of the river do not approach so closely to the valley bluffs as they do farther downstream. In characteristic manner the highway skirts the longer and broader Wrightsville valley bottom on its higher bluff margin, crosses the mouth of Ohio Brush Creek (Fig. 2) Valley at the upper end of the section, and enters the next valley unit. At the lower end the little, partially deserted village of Wrightsville lies on the bank of the river at the end of a road, about a half mile away from the highway. Tilled fields surround the village and extend up the valley bottom. In the area adjacent to the mouth of Ohio Brush Creek, both waste land and forest exceed cropped land, and productive occupance falls to a low level. Long lanes cross the valley bottom from the highway to the riverfront. Farmsteads line both the waterfront and the highway along the bluff, leaving the lower, central portion of the valley bottom to waste land and forest. Many of the riverfront farms have river landings of their own. On the fifty-two miles of river in the Western Rural Division, there are sixty-six farm landings.

On the Kentucky side (Fig. 6, Sec. 7 of the Inner Zone--Sections of the Western Rural Division) bottom land agriculture covers the wide downstream crescent, whereas the village of Concord and the Chesapeake and Ohio Railroad are the chief cultural features on the narrow upstream portion. The usual agricultural occupance of medium intensity, consisting of tilled crops, hay, pasture, woodland, and waste land, dominates the broad valley bottom. The railroad pursues a middle course through the bottom land. From the railroad station of Irwin at the lower end of the section, a road from the upland takes up a bluff-side position on the valley bottom. Intermittent drainage has dissected the cres-

cent transversely, so a ladder pattern of farmstead lanes has developed between the road and the riverfront along the flat surfaces between the gullies.

Sycamore Creek joins the Ohio about midway of the upstream portion of the narrow valley bottom, and there in the mouth of the valley is the little village of Concord. Its gristmill and sawmill are no longer operating, and its waterfront is vacant except for a small ferry. Farms cover the narrow valley bottom; the railroad passes through with little regard for the village; and dirt roads extending up the valley to Vanceburg and up Sycamore Valley to the highway ten miles away, furnish access to it.

Rome-Carrs District

From Brush Creek Island to the short Sandy Springs Bend (Fig. 6, Sec. 12 of the Inner Zone--Sections of the Western Rural Division), the river curves to the Ohio side in the extremely flat bend of the Rome-Carrs district (Fig. 6, Secs. 9 and 10 of the Inner Zone--Sections of the Western Rural Division). The little village of Rome or Stouts Post Office occupies the widest part of the narrow valley bottom just above the mouth of Stouts Run (Fig. 6, Sec. 3 of the Tributary Zone--Sections of the Western Rural Division). All connections with the river have been abandoned, and now the agricultural economy of the area finds its outlet via the highway, which skirts the foot of the valley wall. Since the valley bottom is narrow, most of the farmsteads are on the highway where, as in other sections, they mingle almost imperceptibly with the subsistence farmsteads of the valley slopes. Below Rome the meandering course of Stouts Run has dissected the valley floor so extensively that much forest and waste land is in evidence. At the lower end the valley bottom narrows so much that only a fringe of willows and brush separate the road from the river. Above the village, however, the customary cropped fields, pasture, and hay utilize the smooth bottom land.

The Chesapeake and Ohio Railroad, paralleled first on one side and then on the other by a dirt road, penetrates the center of a broad agricultural valley bottom on the Kentucky side. Near the upper end of the section, a road from the upland joins the valley bottom road by way of Quick Run (Fig. 2), which, although it is a tributary of the Ohio, flows in the opposite direction to the flow of that river. A second road passes through a gap in

the valley wall from Quick Run to the Ohio valley bottom, where it joins the valley bottom road on the other side of the railroad. At the railroad crossing and the junction of the two roads is the station and village of Carrs. There are three other railroad stations, two of which are at road crossings.

A set of navigation locks and dam is located about in the center of the section. There are five sets of navigation locks and dams in the Eastern Segment of the Middle Ohio Valley, two of which are in the Western Rural Division. One set is in the Springdale Section.

Vanceburg-Sandy Springs District

The last upstream double valley bottom district of the division is the Vanceburg-Sandy Springs District (Fig. 6, Secs. 11 and 12 of the Inner Zone--Sections of the Western Rural Division). The valley floor on the inside of the bend on the Ohio side, the Sandy-Springs Section, is wide and decidedly convex. At the center of the section a small terrace (Fig. 4) rises about forty feet above the valley bottom. The bilateral pattern of farmsteads is well developed on the valley bottom, for the highway follows the outer edge of the terrace and a wide sag has developed in the middle of the section. The proportion of waste land is especially high in this section, although the area is of medium utility, in part because the soil has a much higher silt content than it has in other portions of the district. Cedar trees and little patches of scrub oak are scattered over the valley floor, especially on the terrace, where the productive utilization is low, and various species of cacti grow abundantly. The little village of Sandy Springs occupies a spot on the highway in the center of the section at the foot of the terrace, where a road crosses the valley bottom to the ferry to Vanceburg, Kentucky.

The valley floor on the outside of the bend is narrow, and somewhat below its center in the mouth of Salt Lick Creek Valley is Vanceburg, Kentucky. With a population of only 1,388, Vanceburg is the largest town and county seat of a county of approximately 500 square miles, lying almost entirely between the Knobs and Pottsville escarpment on the western margin of the Appalachian Plateau. The Chesapeake and Ohio Railroad follows the bluff-side of the narrow valley bottom through the town, whereas

the unpaved state highway turns aside in the valley of Salt Lick Creek. From the headwaters of Salt Lick Creek, the road crosses a broad saddle in the Knobs to a branch of Cabin Creek, which it traverses to the uplands above Maysville. From there it enters that city through a tributary valley.

On the wider valley bottom of the Ohio above the mouth of Salt Lick Creek (Fig. 2), the town is compact and consists of several streets parallel with the Ohio. Single streets extend out along Salt Lick Valley and a tributary valley, and upstream along the narrow valley bottom of the Ohio. Like much of the Western Division of the Eastern Segment of the Middle Ohio Valley, Vanceburg seems to be living essentially in the past, although its retrogression is not as conspicuous as that of the smaller villages. Flashing neon signs and shining store fronts have no part in the personality of Vanceburg. Wooden awnings hang out over narrow, unpaved streets used alike by automobiles and mule teams. A rickety little ferry plies between the waterfront and Sandy Springs, whereas nearby in an open square, mules and other farm animals are sold at public auction. Elsewhere in the town's pattern a gristmill, a sawmill, a tannery, and a shoe factory are as much of the past as the freshly-painted blue coat of the cast iron soldier resting on his musket under the tall old trees before the little red brick courthouse. Vanceburg is the heart of a sequestered agricultural district, consisting of the valley bottom and associated uplands of a portion of the Western Rural Division of the Eastern Segment of the Middle Ohio Valley, especially that part of Kentucky on the inside of the major bend of the Ohio between Cabin and Salt Lick creeks.

Black Oak District

The remaining portion of the Inner Zone consists of three districts above Vanceburg on the Kentucky side of the river only. The first, Black Oak Section (Fig. 6, Sec. 13 of the Inner Zone--Sections of the Western Rural Division), is a strictly agricultural district of medium intensity of general farms. There are no towns or villages, but the railroad, following a mid-section course, maintains a station about opposite the town of Buena Vista, Ohio (Fig. 2), which it is intended to serve. The road follows the edge of a dissected terrace and thus separates the subsistence marginal zone from the general commercial agriculture

of the valley bottom.

Garrison District

In marked contrast is the next district (Fig. 6, Sec. 14 of the Inner Zone--Sections of the Western Rural Division) for there are two villages and a railroad station in the midst of a district of subsistence farms. The railroad passes through the smooth central portion of the valley bottom, whereas the road more closely approaches the margin of the bluff. At the wide mouth of the Kinniconick Valley (Fig. 6, Sec. 7 of the Tributary Zone--Sections of the Western Rural Division) is the railroad village of Garrison. Since the chief function is railroad maintenance, the village has no connection with the river, and most of it lies between the railroad and the highway. A branch line from Carter, Kentucky joins the main line there by way of the Kinniconick Valley. Towards the upper end of the section, the little village of Quincy occupies a similar position at the mouth of a small tributary valley.

St. Paul District

Commercial agriculture spreads over the smooth surface of the St. Paul Section (Fig. 6, Sec. 15 of the Inner Zone--Sections of the Western Rural Division), the last district upstream of the Inner Zone of the valley bottom. Heavy forests cover the neighboring valley walls and follow the dissected valleys of the tributaries. Both the highway, surfaced in that part of the valley, and the railroad are near the bluff-side of the valley floor. At about the center of the section a few buildings, strung along a single side road, and the railroad station of St. Paul furnish the service functions of a village.

Subsistence Economy of the Tributary Zones

On both sides of the commercial agricultural Inner Zone of the valley bottom is an irregular zone of subsistence agriculture. Productive utilization is of low degree. These subsistence zones (Fig. 3) are associated with the valley bluffs, the tributary valleys, and the dissected terraces (Fig. 4). On the Ohio side, especially where the surface highway follows the juncture of the valley bluff and the valley floor, a well-marked oc-

cupance unconformity has developed. Here farmsteads of both the valley bottom commercial agriculture and the subsistence valley bluff agriculture occupy sites along the road on the slope side. Both enjoy the transportation facilities afforded by the highway. The larger farmsteads, however, lose some of the advantages of flat space on which to arrange conveniently their buildings but gain a greater measure of flood protection from their elevated position. A reallocation of all the farmsteads of the valley bottom to bluff-side sites, which could be obtained from bluff-side holdings in exchange for parcels of valley bottom land, might work to the advantage of both types of farms as a flood protection measure in the agricultural areas of the Middle Ohio Valley. Thus, all of the bottom land would be free for agriculture, and the winter and spring floods would be less damaging.

Ohio Section

On the Ohio side the forest and waste land, which extends up the steep and rocky face of the bluff above the roadside row of farmsteads, is interrupted by seven mature valleys likewise dominated by subsistence farms. The westernmost valley crosses the wide part of the Aberdeen Section, whereas the second valley node in the Tributary Zone is in a similar position in the Buzzards Roost Section. For seventeen more miles upstream the valley wall is dissected only by youthful valleys, which are of little significance as far as a change in the pattern of cultural occupance of the zone is concerned. The eastern portion, however, has five of the seven mature valleys. Ohio Brush Creek (Fig. 6, Sec. 2 of the Tributary Zone--Sections of the Western Rural Division), the next one in order in an upstream manner, has the largest valley in the area. The subsistence zone there widens and extends indefinitely up the valley. Little farmsteads occupy both slopes; patches of corn dot its valley floor; forest is in abundance; logs for the portable sawmill at the mouth of the valley are much in evidence. The Tributary Zone bordering the Rome Section is especially attenuated, for there the cultural features extend up the valley of Stouts Run (Fig. 6, Sec. 3 of the Tributary Zone--Sections of the Western Rural Division) and other smaller tributaries.

Kentucky Section

On the Kentucky side the Tributary Zone is more conspicuously modified, for several of the valley bottom towns are built in the mouths of the tributary valleys. Valley bottom roads and railroad spurs join the Inner Zone by way of them, whereas dissected terraces of subsistence agriculture give extreme width to the zone. The tributary valleys of the Maysville Section are the first modification, for there subsistence farms line the highway which returns again to the Inner Zone of the Ohio valley bottom at Vanceburg through the same type of cultural occupance in the valley of Salt Lick Creek (Fig. 6, Secs. 4 and 6 of the Tributary Zone--Sections of the Western Rural Divisions). In the area between them the valleys of several creeks, of which Cabin Creek (Fig. 6, Sec. 5 of the Tributary Zone--Sections of the Western Rural Division) is the largest, are the major subsistence farm areas. These subsistent farm areas interrupt an area of valley wall, where in part because of a lack of any sort of roads, forest, waste land, and a few scattered slope farms constitute the cultural occupance.

East of Vanceburg the Tributary Zone widens out on two dissected terraces. The first one rises above the Black Oak Section and extends back to the forested valley bluffs. Crops, pasture, and forest, in which subsistence farms are in the majority, predominate, although a number of commercial farms are also present, especially along the road, which marks the line of contact with the valley floor. Orchards are numerous here. The zone narrows again to the valley wall at the upper end of the Black Oak Section and then widens in the valley of Kinniconick Creek and the adjacent upper Black Oak Terrace (Fig. 6, Secs. 7 and 8 of the Tributary Zone--Sections of the Western Rural Division). Tributary valleys of the Kinniconick are further extensions of the subsistence agriculture and forest area of the dissected terrace. Above the Black Oak Terrace the zone narrows to a strip of forest on the steep face of the valley bluff, which rises sharply above the St. Paul Section, the easternmost district of the Western Rural Division.

Subsistence Economy of the Peripheral Zones

Beyond the Tributary zones of the valley bluffs and tributary valleys, a subsistence farm and forest economy occupies the

dissected and relatively inaccessible upland of the back country. Most of the farmsteads, as well as the roads, are in the stream valleys, for the ridge tops are neither level nor continuous. Much of the forest is second growth. Little patches of corn and tobacco dot the valleys and hillsides, in places almost to their summits, with many brush and weed grown, abandoned, eroded fields. Tributary valleys comprise the connections between the back country and the commercial Inner Zone of the Ohio River valley bottom. It is along the narrow valleys that the roads twist and turn, in places fording the streams or crossing a covered wooden bridge that may not be in the best of repair. Heavy rains frequently cause much damage to the poorly-surfaced roads and sometimes destroy bridges that may not be replaced for several years. Little villages still with their pioneer characteristics occupy stream intersections, whereas the roads circuitously connect them with the towns near the mouths of the tributary valleys on the valley floor of the Ohio. The subsistence culture of the back country constitutes a wide zone in the eastern part of the area, for the dissected hill country extends for miles on either side of the river. Distance, therefore, is the significant factor in the cultural quality of the division. In the western part, however, general commercial agriculture of the rolling till upland replaces the subsistence economy of the hills, so that the valley and slope culture of the Peripheral Zone is limited to a narrow strip of dissection beyond the valley rim.

Summary

The geographic qualities of the Western Rural Division of the Eastern Segment of the Middle Ohio Valley find expression in five parallel zones. The middle or Inner Zone along the river is characterized by commercial agriculture definitely related to the well-drained, flat, alluvial valley floor. This zone has the richest agricultural lands of the division. Each of the more important towns of the division occupies flat land on the valley bottom where a tributary valley opens into the main valley. In such positions, they are available both to the productive bottom lands and to the adjacent Tributary and Peripheral zones. Highways and a railroad use the flat surface of the valley floor, for it offers a fairly direct and well-graded route between extra-regional points, as well as a productive area in itself. These

advantages, however, are somewhat offset by a serious disadvantage, namely, the ever present danger of winter or early spring floods. On each side of the Inner Zone is a less intensive, in fact, quite sparsely occupied Tributary Zone of agriculture and forest activities. In each case the zone occupies the steep and rocky valley bluffs and extends up the valleys and upon the dissected terraces. Flat land in these two zones is decidedly lacking, and the thin soil and steep slopes of the valley bluffs, tributary valleys, and dissected terraces are serious disadvantages. On the other hand, proximity to the transportational features and market towns on the valley bottom, and an elevation high enough to protect all but the lowest parts of the area from flood, partially compensate for the rough terrain and scanty soils. The Peripheral zones are areas of subsistence culture which represent a direct expression of steep slopes of the maturely dissected upland through which this stretch of the Ohio River flows. In the eastern part of the division the zones vary in width with accessibility to the Ohio, but in the western part they narrow rapidly to thin strips occupying the dissected margin between the crest of the valley walls and the productive general commercial agriculture of the gently rolling interior till uplands. In the Peripheral Zone of subsistence agriculture all of the disadvantages of the Tributary Zone are present, plus the disadvantage of inaccessibility to the transportation facilities of the valley bottom of the Ohio.

CHAPTER III

CENTRAL URBAN DIVISION

Districts and Economies of the Division

The Central Urban Division (Fig. 6), occupying about twenty-seven miles of riverfront on the Ohio side, but only seven miles on the other, is made up of three contrasting though functionally related parts. The more extensive area on the Ohio side is divided by the Scioto River into the Western Scioto County District and the Portsmouth District. On the Kentucky side, directly opposite the mouth of the Scioto, is the smaller Fullerton District. The economy of the division centers in the Portsmouth District, which occupies most of the usable space on the outside of the major northward great bend of the river. The situation of Portsmouth (Fig. 2) is second only to that of Cincinnati in linking the northwesterly trending routes of the Middle Ohio Valley with the southward projections of the Great Lakes.

The Portsmouth District is dominated by the commercial and industrial economies of a strategically situated river and railroad city of 55,000 population. The district is first of all the retail, wholesale, and market center of an area extending in both directions along the Ohio and for some distance up the Scioto Valley. Secondly, the district is an industrial area of significance which affords regular employment in the shoe factories, steel mills, and related industries for approximately 18,000 inhabitants of the district, as well as part-time work for a large number of dwellers in both of the other districts of the division. The Western Scioto County District is a dependent of the Portsmouth District. The valley floors of the Ohio and the Scioto are commercial agricultural zones in which much of the dairy and other agricultural commodities consumed in Portsmouth are produced, whereas the valley walls, tributary valleys, and terraces are part-time and subsistence farming sections which are dependent on Portsmouth industries for their part-time employment. This district constitutes a large portion of the trade area of the Ports-

mouth commercial center. The Fullerton District across the river is also a commercial agricultural and part-time agricultural section as well as a railroad center within the trade area of Portsmouth.

Portsmouth Commercial and Industrial District

Since all of the cities of the Eastern Segment of the Middle Ohio Valley occupy the relatively narrow valley floor (Fig. 3). they are all oriented with their major axis parallel to the river. Thus, the longitudinal valley unit consists of the four urban sections of Portsmouth, New Boston, Sciotoville, and Wheelersburg, united by a major transverse highway. The general pattern of the Portsmouth District (Fig. 7) conforms to the usual arrangement, yet local areas digress markedly. Federal highway U.S. 52, which parallels the river most of the way through the district, is the longitudinal axis. At four points the axis crosses valleys normal to the Ohio; by means of these valleys transverse highways join the valley floor route, and at the highway junctions nodes have developed in the city pattern at right angles to the river. The largest of the tributary valleys is the Scioto at the extreme western edge of the district. Here federal highway U.S. 23, the major transverse axis of the urban pattern, traverses a terrace on its eastern side, crosses the Ohio on the only highway bridge (Fig. 3) in the Central Urban Division and continues southward along the Ohio and Big Sandy valleys. Munn Run, a short, narrow tributary, in which is state route Ohio 139, forms the center of the New Boston node. The Little Scioto Valley and state route Ohio 335, center in Sciotoville, whereas the pattern of Wheelersburg (Figs. 2 and 3) is formed by the intersection of several transverse rural roads with the valley highway in the mouth of the old preglacial Teays Valley.

Portsmouth

The pattern of Portsmouth (Fig. 7) is rectangular[1] extending for approximately two-and-one-half miles along the river. In

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[1]Although the rectangular corporate limits of the city of Portsmouth include most of the district, it also includes portions that are of little significance to the urban activities, and it excludes areas of real importance.

keeping with qualities of its site, however, the river margins conform to the regular shape of the river bank, whereas the bluff margins follow the irregular outline of the valley walls. Likewise, the cultural patterns on the flat valley bottom are regular and complete, whereas those of the dissected terraces are incomplete and irregular. Portsmouth occupies three distinct levels above the Ohio River. The first one is the valley floor (Fig. 4) about fifty feet above the river occupied by commerce, industry, and residence, the second is a terrace about forty feet above the valley floor occupied entirely by residence, and the third is a dissected upper terrace about sixty feet higher occupied by scattered residences.

Commercial, industrial, and residential valley floor.--The commercial core of Portsmouth occupies the midwestern portion of the valley floor at the intersection of the major longitudinal and transverse highways. Retail stores (Fig. 7) and other service center features line both sides of both streets for a number of blocks forming a compact commercial core around the old post office square at the intersection. At the approach to the toll bridge the commercial core turns west and extends to the Scioto River. Midway of this area, north of the old wharf on the Ohio, is a retail, wholesale, and industrial area circuitously served by a spur of the Baltimore and Ohio Railroad.

The western triangle, at the junction of the Scioto and the Ohio rivers, is essentially the old river town, though it is not decadent. Its major streets parallel the Ohio, whereas the transverse ones extend to the concrete flood wall. The wharf and wharfboat lie outside of the flood wall at the foot of the old market street. A park now occupies the rest of the valley floor outside of the flood wall. A varied group of residential and poor commercial buildings along the riverfront street overlook the river; most of the buildings, regardless of their earlier purpose, are now poor habitations. A few old mansions still reflect the glory of the steamboat era. The business section, along the next street, occupies the highest ground along the riverfront.[1] A rectangular pattern of residential streets occupies the central portion of the triangle which slopes gently back from the busi-

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[1]The 1937 flood was not so deep there as it was in the sag farther back on the valley floor.

ness section. Several small industrial plants on the outer margin, served by railroad spurs, produce wood products and light machinery. A large sand and gravel wharf is the only cultural occupance of the Scioto floodplain. Machinery is used to convey the heavy freight from barges at the mouth of the Scioto to the commercial area above.[1]

The east side of the lower city is an area of commerce, industry, and residences. Most of the waterfront is an unused strip of brush and weeds, extending the entire length of the section. A few rows of corn, a few houses, a municipal plant, and an athletic field are the only cultural features on the waterfront. Residences of a medium quality occupy most of the east side. The best homes occupy a ridge near the front of the valley floor, whereas the poorest line the waterfront street.[2]

The Baltimore and Ohio and the Norfolk and Western railroads, whose rights-of-way on the valley floor are the center of a street,[3] intersect the main highway at the eastern margin of the valley bottom. Westward from this point is an area of wholesale and manufacturing containing the industry for which the district is best known, the making of shoes and other leather goods. Commerce and mediocre residences adjoin the industrial area on the north, and poor residences border it on the other sides. Westward along the railroad are wholesale and poor residential areas. A poor residential area also utilizes the land along the railroad north of the commercial core.

The remaining portion of the valley floor is a triangle north of the railroad, which trails off up the Scioto Valley above the floodplain as a narrow terrace by means of which the transverse highway enters the city. Wholesale and retail establish-

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[1]The Scioto is navigable for one-half mile above the Ohio, due to the slack water caused by dam no. 31 of the Ohio river navigation improvement.

[2]The whole area was inundated during the flood of January, 1937. Although the depth of the water depended upon the minor configurations of the surface, the water generally covered the first story of the buildings.

[3]Since all of the valley towns antedate the railroads, there was little space left for the latter to occupy, so in many cases their right-of-way is the center of a street in a portion of the city quite removed from the establishments depending upon them.

ments line the highway. The Norfolk and Western Railroad turns northward through a wholesale and mediocre residential area to the railroad station at the apex of the triangle. The railroad extends northward along the narrow terrace through the commercial area. At the city limits one branch of the railroad continues up the Scioto Valley (Fig. 2), and the other crosses the Scioto floodplain on its way to Cincinnati.

Residential terrace.--A residential area of average to superior homes completely occupies the rolling surface of an upper terrace (Figs. 4 and 7) and is, therefore, above the level of even the most severe floods. A narrow appendage continues northward along the transverse highway U.S. 23, as a completely occupied section of residences and commerce utilizing the narrow terrace above the Scioto floodplain.

Scattered residential terrace.--The third level (Figs. 4 and 7) is utilized by scattered new homes, most of which are of a superior type, which occupy pleasant sites on winding roads on a dissected, forested terrace a hundred or more feet above the lower town. On a low saddle in the highest ridge on the terrace is a U-shaped reservoir with an enclosed platform top, which furnishes the gravity pressure for the city water. The water is pumped from the Ohio River at the eastern limits of New Boston to a filter from which it is conducted across the hills to the reservoir. Since some of the houses on the third level are above the source of pressure, a tank on the bluffs above furnish them with water. The concrete top of the reservoir, covered with clay and enclosed with wire netting, provides a splendid base for a number of tennis courts and other games for the adjacent park, whereas unused forest spreads over the rest of the steepest slopes and ridges.

New Boston

The New Boston node (Fig. 6, Sec. 2 of the Inner Zone--Sections of the Central Urban Division) is the industrial section of the Portsmouth Commercial and Industrial District. Heavy industries (Fig. 7) occupy all of the bottom land in New Boston from the riverfront to the narrow residential streets along the valley wall. Although this area has no greater advantages for obtaining bulky raw materials than Portsmouth, it did have the advantage of extensive unoccupied riverfront at the place where the channel most closely approached the shore. Iron and steel, ceramics, and

coal products are the manufactures, all of which depend heavily on coal brought to them from the nearby Appalachian coal fields. Likewise, iron ore from the Great Lakes region is a significant bulky necessity. The Wheeling Steel Corporation, producing sheets, wire, rods, tie plates, nails, drums, boilers, and tanks, at present consumes great quantities of scrap iron as well as ore. Trucks loaded with junk are frequent sights on the highways, and collecting yards along the railroad and river in the eastern half of the district are piled high with scrap iron. In fact, a junk yard is a significant feature of the narrow valley floor just above the New Boston heavy industrial section. Both limestone and clay are available in the adjacent valley bluffs. Just within the western corporate limits of New Boston, where the highway skirts the foot of the bluff, the Peebles Brick Company quarries rock from the bluff for use in the brick plants on the waterfront. Quantities of water, too, are available both from the Ohio and from artificial lakes (Fig. 7) that have been formed by damming tributary streams.

Steep, rocky bluffs (Fig. 4) rise sharply above the narrow valley floor at the eastern edge of the Portsmouth node. The major highway axis follows the irregular line of the bluff quite closely, whereas the railroads (Fig. 7) pursue as straight a course as possible across the valley bottom. A narrow strip of residences and commerce, which becomes completely residential several blocks wide near the western boundary of New Boston, occupies both sides of the highway between the railroad and the bluff. The yards of the Norfolk and Western Railroad terminal spread out over most of the level bottom land between the Portsmouth node and the New Boston city limits. The highway follows the bluff face so closely in the city that there is only room for an occasional cluster of poor houses on the bluff side of the street, except in the valley of Munn Run. Another street, at a somewhat lower level, parallels the highway as far as the mill pond and forms the center of a mediocre residential area which furnishes the employees for the adjacent heavy industries of the riverfront. A somewhat better residential area occupies a portion of the tributary valley above the highway. The adjacent few blocks compose the commercial core of New Boston. Beyond the mill pond the valley bluffs rise abruptly, with here and there a few decrepit shacks wedged between the highway and the bluff.

The pumping station and filtration plant of the Portsmouth water supply are just above the city limits of New Boston. From there to Sciotoville only the railroad and the highway utilize the narrow valley floor between the forested rocky bluffs and the river.

Sciotoville

The third node on the longitudinal urban axis is Sciotoville (Fig. 6, Sec. 3 of the Inner Zone--Sections of the Central Urban Division), a railroad junction and commercial town which has been included within the corporate (Fig. 7) as well as functional limits of Portsmouth. A commercial area of a few blocks lines both sides of the highway axis which there is the second street from the river. The rest of the town wanders in an irregular manner up the Little Scioto Valley. Completely built up residential areas occupy most of the section, with scattered houses on the periphery. The Norfolk and Western Railroad on the riverfront is joined by the Baltimore and Ohio Railroad from the Little Scioto Valley at the foot of the bluff. At this point commercial functions, chiefly wholesale, occupy the entire valley floor. A branch of the Chesapeake and Ohio Railroad crosses the Ohio on a bridge (Fig. 7) which also carries it over the Norfolk and Western Railroad and the highway to a grade on the side of the valley of the Little Scioto. There is much forested and unused land in the Sciotoville Section, for the valley of the Little Scioto is deep, the bluffs are steep and rocky, and the valley floor of the Ohio is extremely narrow. Steep wooded bluffs and a narrow valley floor, utilized only by the railroad and highway, separate the New Boston and Sciotoville sections.

Wheelersburg

The fourth node, Wheelersburg (Fig. 6, Sec. 4 of the Inner Zone--Sections of the Central Urban Division), is a star-shaped village at the intersection of the valley bottom highway (Fig. 3) with a road from the Teays Strath. The village serves a residential function for the Portsmouth Industrial District, although it also is a service center for the adjacent agricultural areas. Attempts have been made, as the abandoned factories along the railroad attest, to establish manufacturing within the village. Wood products of the type produced in Portsmouth, especially

shoe heels and lasts, were made here for some time. Its site, at the western edge of the old preglacial strath (Fig. 4), is sufficiently high so that only the lower western part of the town was reached by the 1937 flood.

A continuous row of part-time farms line both sides of the highway from Sciotoville to the town of Wheelersburg. For the most part, the buildings are small, one-story, frame structures, well-built and well-kept in appearance when contrasted with many of the rough board or log subsistence farmsteads of the uplands. In part, the section serves a residential function for employees in the industries of the Portsmouth District. Much of the valley bottom is unused, for holdings are small and only a few commercial farms have tilled fields. Truck crops and poultry are outstanding in the agriculture, and indicate the manner in which the part-time industrial employees supplement their livelihood.

Northward from Wheelersburg on the undulating surface of the preglacial strath, locally known as Dogwood Ridge, the tilled fields and farmsteads of an agriculture (Fig. 3) of a medium degree of productivity repeats the patterns and functions of the commercial farms of the valley floor. Large homesteads are lined up along straight roads, and at a crossroad is a little village. Beyond the old terrace, however, subsistence farms utilize the maturely dissected uplands and the slopes and narrow bottoms of the Little Scioto Valley.

Functional Relations

Since the Portsmouth District has developed around the outside of the major northern bend (Fig. 3) of the Eastern Segment of the Middle Ohio River, it would seem logical to expect the functional center to be at the center of the outside of the bend from which cultural activities would grade in all directions from the river. This is not the case, however, for the advantages of a central position are outweighed by the disadvantages of steep valley walls (Fig. 4) and a narrow valley floor. Likewise, the advantage of the gateway of the broad valley of the Scioto west of the center is a significant factor. An asymmetrical urban unit, with a core exposed on the western side and joined on the east by an attenuated intermediate and a diminished peripheral zone, has developed. The Scioto, pursuing a meandering course in a valley equally as broad (Fig. 3) as that of the Ohio,

follows its left bank in its lower course and enters the Ohio at the very eastern corner of its valley. A large part of the Scioto Valley is a floodplain lower than the valley floor of the Ohio, and since it therefore is subject to frequent high-water, is undesirable for urban uses. Routes of transportation (Figs. 2 and 7) focus on the large, well-drained valley floor just east of the Scioto-Ohio confluent, since movement in and out of the Middle Ohio Valley by way of the Scioto more frequently originates in or is headed for areas east of the mouth of the Scioto. Thus, the wide valley floor on the east side of the Scioto on which the city of Portsmouth developed has both a site and a situation advantage over the narrow valley floor on the west side.[1] Since Portsmouth has been in existence for 135 years, level space on the wide valley floor is for the most part utilized (Fig. 7) for commercial and residential purposes. Industry there consists either of light manufactures in small buildings which can and do utilize small areas within Portsmouth, or heavy industries which require both large buildings and extensive areas. The latter (Fig. 7) occupy the New Boston valley floor, the largest amount of available space nearest the focal center. The light manufactures are chiefly the outgrowth of the local needs of a market center of an agricultural community in which crops, animal products, and forest products were the available commodities. Today shoes and leather goods, shoe boxes, laces, and wooden heels and lasts, hardwood flooring, stoves, and light machinery are the light manufactures which have become of national importance. Eastward, the attenuated intermediate zone of heavy industry is attached to the core functions by means of the narrow valley bottom, which likewise includes the two nodes of Sciotoville and Wheelersburg in the narrow residential periphery of the Portsmouth District.

Western Scioto County District

Westward from Portsmouth contrasting types of land-use occupy three quite distinct landform types. The broad bottom lands of the Ohio and the Scioto (Figs. 3 and 4) are utilized by general commercial agriculture of a high degree of intensity. The

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[1]Both the town of Alexandria, laid out in 1799 and moved into Portsmouth ten years later, and the abandoned Ohio-Erie Canal which terminated about a mile below the mouth of the Scioto River, occupied the east side of the Scioto Valley.

adjacent valley bluffs, terraces, and tributary valleys are occupied by part-time farms and villages which are tributary to the Portsmouth District. A widely scattered subsistence agricultural population utilize the youthful tributary valleys and maturely dissected upland. Two of the types, the commercial and part-time farms are intimately intermingled along the highway at the junction of the valley floor and the valley bluff, which leads across the Scioto to the heart of the Portsmouth District by way of a Y-shaped piked road and a bridge. In fact, the longitudinal axis of the district, U.S. 52, crosses the Scioto (Fig. 7) and continues westward throughout the entire area as the line of contact between valley bottom and upland economies.

Commercial Agriculture of the Valley Bottom

The valley bottom is a zone of general commercial agriculture of a high degree of utilization. Patterns of occupance differ sufficiently to throw the four related sections into which the valley floor is divided into relief. The northernmost one is the floor of the Scioto Valley, followed in turn by the Friendship, Pond Run, and Buena Vista sections of the Ohio valley bottom.

Scioto Valley Section.--The floor of the Scioto Valley (Fig. 6, Sec. 5 of the Inner Zone--Sections of the Central Urban Division) is almost one continuous corn field, interrupted by an occasional hay or grain field or a narrow strip of trees along the margins of the stream and some of its intermittent tributaries. There are neither roads nor farmsteads on the valley floor, and because of the lack of roads there are very few fences. Perhaps nowhere else in the entire Eastern Segment of the Middle Ohio Valley is land so completely utilized by agriculture, particularly tilled crops, as in the Scioto Valley Section of the Western Scioto County District. Intensive agriculture occupies the wide floodplain (Fig. 4) of the Scioto, which is considerably lower than the adjacent valley floor of the Ohio, is therefore much more subject to floods, and consequently is without farmsteads. Winter floods are decidedly unfavorable for winter wheat, which condition helps explain the absence of winter wheat; late floods frequently delay even the planting of corn. The deep alluvial soil and the presence of abundant soil moisture even during years of drought, however, are compensating advantages. The floodplain narrows to-

wards the mouth of the Scioto; tilled crops are less extensive on the wet lands; and trees and brush line the banks of both the Scioto and the Ohio and fill the swampy bottoms of abandoned meanders. A prong of the valley floor of the Ohio extends up the right side of the Scioto Valley for a few miles. On the upper edge of this prong is the Scioto Valley highway Ohio 112; this joins the Ohio Valley highway U.S. 52 about at the center of the Scioto Valley. A short road, Ohio 239, connects the two at the foot of the valley bluff. A few farmsteads and a number of decrepit little part-time habitations, some of which have been raised on stilt-like piers since the last severe flood, line the valley bottom side of the highway. Most of the farmsteads of the floodplain farms, however, are on higher ground on the bluff-side of the road. This arrangement may point the way to the solution of the flood problem in the agricultural lands of the valley bottom for the entire Middle Ohio Valley.

Friendship Section.--Below the Scioto Valley for about six miles the Ohio describes a broad open bend, on the inside of which is the wide Friendship Section (Fig. 6, Sec. 6 of the Inner-Zone--Sections of the Central Urban Division). In characteristic manner the valley highway U.S. 52 marks the line of contact between the valley floor and the valley bluffs. Two roads from the upland join the valley highway by way of tributary valleys, one of which is at the upper and one at the lower end of the section. Numerous farmsteads of both commercial and part-time varieties (Fig. 3) are closely spaced along both sides of the highway. On the valley side the commercial type is in the majority, except where village-like agglomerations of part-time farms exist. The largest of these is the valley bottom portion of the village of Friendship (Fig. 2), which spreads into the valley mouth of Turkey Creek. Large gardens and in many cases a cow or two are attached to the small residential units which form the compact body of the village. The roadside and riverfront pattern of valley bottom farmsteads is well developed in the Friendship Section because the chief tributary, Turkey Creek, approaching the Ohio in a barbed manner, describes an extensive loop (Fig. 4) in the middle of the section before entering the Ohio. Intermittent tributaries, parallel to the Ohio, further dissect the mid-section sag. Therefore the greater part of the valley bottom farmsteads occupy roadside sites, whereas a second group on the riverfront are reached by

lanes and an L-shaped road.

The usual system of corn, winter wheat, soya beans, and tobacco is practiced in the Friendship Section, and agricultural use of land is at a high degree of intensity. Pasture and hay, with attendant dairy cattle are important, since this is the largest agricultural area near the Portsmouth District. Pasture is in fact more extensive than tilled crops, and hay, in third position, is a close second to crops. The dissected part of the mid-section sag, and the poorly-drained areas below the mouth of the Scioto, are especially important areas of pasture and hay.

A golf course and a small air port (Fig. 3), Raven Rock Air Field, both of which serve the City of Portsmouth, extend from the highway to the river in the eastern part of the section.

Pond Run Section.--The lower end of the Friendship Section reaches its narrowest point of a quarter of a mile in width on the outside of an open bend of the river. From there the river describes another open bend of six miles, on the inside of which is the Pond Run Section (Fig. 6, Sec. 7 of the Inner Zone--Sections of the Central Urban Division). Except for the absence of part-time (Fig. 3) villages this section is very similar to the Friendship Section. It is composed of a bilateral pattern of commercial farmsteads related to a mid-section sag that is the result of the barbed condition of a small tributary. The highway follows the bluff-side. Agriculture is intensive. Pasture is more extensive than tilled crops, followed in turn by hay. Forest and waste land are in the minority, and occupy the river banks and areas of greatest dissection.

Buena Vista Section.--The last of the Western Scioto County District is the Buena Vista Section (Fig. 6, Sec. 8 of the Inner Zone--Sections of the Central Urban Division) which occupies most of the outside of an open bend five miles in length. The wide upstream portion repeats the occupance forms and patterns of the preceding section, but the narrow lower portion changes quite rapidly to form the transition to the adjacent downstream valley division. In the lower portion part-time agriculture and the decadent river town of Buena Vista constitute the cultural occupance. All were severely damaged by the 1937 flood. The village (Fig. 3) occupies the downstream point of the valley floor between the highway and the Ohio River. A feeble attempt at commercial activities straggles along the highway beneath the rocky

cliffs of the valley wall. A group of poor houses, surrounded by patches of corn and tobacco, face the two cross streets, which end at the river in stone paved inclines. At the lower street two well-kept homes with beautiful gardens quite out of harmony with the rest of the decadent town overlook the river. At the other incline rusty machinery, anchor rings half buried in the grass and brush, a pen of pigs, and the rubbish of the village dump are visible evidences of a changed occupance.

Below Buena Vista the slender valley floor is the site of a small area of part-time farms. Several houses are clustered together along the highway at the foot of the steep, rocky bluff in a little subsistence settlement known as Rockville. Narrow fields almost completely utilize the narrow bit of level land between the road and the river. Since the village of Buena Vista and the subsistence hamlet of Rockville are on the outside of a sharp bend, the full force of the current of the 1937 flood was thrown against the valley wall, with consequent heavy destruction. In fact, most of the houses in Rockville were washed away, while buildings in Buena Vista, whose position is not quite so exposed, were nevertheless in some instances moved from their foundations.

Part-Time Farm and Village Zone

Beyond the general commercial agriculture of the valley bottom is a contrasting zone of part-time (Fig. 3) farms and villages, occupying the tributary (Fig. 4) valleys, terraces, and the valley bluffs. Like the occupance of the valley floor this zone is definitely attached to the Portsmouth District. The Eastern Section, however, which is closer to Portsmouth, has a higher degree of development than the Western Section.

Eastern Section.--This section extends from the valley of Turkey Creek to the valley of Dry Run, a tributary of the Scioto, and in it lie all of the villages of the zone (Fig. 6, Sec. 3 of the Tributary Zone--Sections of the Central Urban Division). The largest of these villages is West Portsmouth (Fig. 2), an unincorporated town of 2,500, that occupies a terrace (Fig. 4) overlooking the Scioto Valley directly across the Scioto River from Portsmouth. Alexandria and Friendship (Figs. 2 and 3) are little string towns in the mouths (Fig. 4) of tributary valleys. Since West Portsmouth occupies a dissected oval terrace (Fig. 4) rather

than the bottom of a narrow valley, it has assumed the shape of a compact agglomeration. In every village part-time or subsistence agriculture dominates the culture. The commercial activities are absent or unimportant and agriculture predominates. Like the individual subsistence farms along the highway, these villages represent a part-time agricultural-industrial economy. Because of nearness to Portsmouth, employment of an unskilled or semi-skilled nature is found in the industries of the city. During periods of industrial inactivity the inhabitants of these villages can make a living from the little fields of their subsistence farms or their village gardens, or if need be, a bit of poaching may be practiced in the neighboring forested hills. Along the highway which connects the part-time farms and villages with the city, the houses are closely spaced and, for the most part, are of the subsistence variety, although there are a few commercial agricultural farmsteads. Here and there other types of functional forms, chiefly those associated with the periphery of a city, are intermingled with the houses. Dance pavilions, tourist camps, roadside saloons and eating places, and a riding academy as well as a number of municipal forms are all there, yet an air of meager subsistence seems to pervade most of the section. Sharp contrasts from the meanest of ill-kept hovels to neat and attractive little cottages are characteristic. In the narrower tributary valleys, too, cultural forms and practices are more primitive than they are in the wider valleys such as that of Turkey Creek. Shallow dug wells supply most of the drinking water outside of the cities over the entire area, since it is both difficult and expensive to obtain water by drilling in the sandstones and shales of the bed rock. In the more prosperous areas, such as the valley of Turkey Creek, wells are curbed and furnished with pumps, but in less favorable places, open wells with a windlass and bucket or with a simple pole sweep are common. A further complication arises from the condition that the more favorable subsistence areas are low enough to be submerged by floods, so the water supply in the open wells often is polluted, whereas the wells above the flood level frequently go dry in summer. It is not unusual for the subsistence dwellers of the upper portions of the short valleys to carry drinking water from wells lower in the valley, and to haul water for other purposes from the streams, even though a torrential thunder shower is able to produce a flood

in their valley severe enough to cause considerable damage.[1]

Western Section.--In the Western Section, extending from seven to twenty miles (Fig. 6, Sec. 4 of the Tributary Zone--Sections of the Central Urban Division) from Portsmouth, villages are absent but part-time farms (Fig. 3) are still numerous along the foot of the bluff, on the terrace (Fig. 4) at the mouth of Upper Twin Creek, and in the tributary valleys. Although there are many short, youthful, tributary valleys in which there are a few subsistence farms, most of them are in the wider valleys. On the highway at the mouths of the two upper valleys are little stores, whereas the village of Buena Vista in the Inner Zone occupies the valley floor at the mouth of the lower valley.

Subsistence Economies of the Upland

Beyond the crest of the valley trough is a dissected, rocky upland 500 feet above the valley floor. The short tributaries which traverse the upland rise within ten miles of the Ohio in a rocky terrain 700 feet above the valley bottom, the highest and roughest part of the back country of the entire area. Although a few subsistence farms utilize the bottoms of most of the larger tributary valleys, forest covers most of the area. The Shawnee State Forest and the Roosevelt Game Preserve have been established there. This type of utilization should be more extensive over much of the dissected uplands of the Middle Ohio Valley. Since the only usable farmland is in the tributary valleys, the largest tributary valleys could still remain in agriculture whereas the rougher terrain could be more successfully utilized in forested game preserves and state parks.

Fullerton District

From Portsmouth the highway U.S. 23 crosses (Fig. 7) the Ohio on the General Grant suspension bridge at a point where the valley bluff (Fig. 4) on the Kentucky side most closely approaches the river. The bridge ends against the steep face of the bluff on a terrace in the center of the town of South Portsmouth.

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[1] These conditions and practices are not limited to this portion of the valley but are generally widespread through the valley and adjacent hills country.

South Portsmouth Section

A continuous row of small houses clings precariously to the edge of the slender terrace below the highway, whereas above it is another row wedged between the highway and the steep face of the bluff. Higher on the bluff isolated houses occupy remnants of narrow terraces. The Chesapeake and Ohio Railroad traverses the continuous narrow valley floor at the western end of which is the railroad station and a number of houses (Fig. 6, Sec. 9 of the Inner Zone--Sections of the Central Urban Division) of the town of South Portsmouth. Brush and trees line the waterfront, with the exception of an occasional patch of corn and a railroad wharf. The importance of the railroad to the village is much greater than its size would warrant, for like most of the railroad towns serving both sides of the river it really is the station for Portsmouth. The Chesapeake and Ohio warehouses on the Ohio side of the river are on the Portsmouth waterfront at the end of the bridge.

Fullerton Section

The row of little houses along the highway on the terrace, and the railroad on the narrow valley floor, continue eastward without interruption from South Portsmouth to Fullerton (Fig. 6, Sec. 10 of the Inner Zone--Sections of the Central Urban Division). As the valley floor widens the highway leaves the slender terrace (Fig. 4), and the village widens out to accommodate several short cross streets along the railroad on the valley bottom. Eastward from Fullerton to Tygarts Creek (Fig. 2) the buildings of several small villages are intermittently scattered over the valley floor. Bits of subsistence agriculture are interspersed here and there among the villages. Between the railroad and the river at the eastern edge of Fullerton is a compact settlement (Fig. 3) of small houses and a few stores connected with the eastern end of the Portsmouth District by a ferry. A second compact area occupies the valley floor between the railroad and the highway. An abandoned brick plant between the waterfront and the railroad just west of Tygarts Creek indicates that a portion of the urban activities at one time extended into that part of the area. The houses are small and most of them are poor, and the absence of a

well-developed commercial area suggests a residential area that is connected with the commercial and industrial economies of Portsmouth across the river.

Firebrick Section

Westward from South Portsmouth general commercial agriculture (Fig. 3) covers the wide valley floor. The railroad pursues a direct route along the outer margin of the floor, whereas the highway extends across a dissected terrace occupied by subsistence farms and forest. The valley bottom narrows and the terrace terminates near the western limit of the division. The government navigation dam and locks are located in the Ohio River at this point, and in a short bottle-necked valley in the steep valley walls are the deteriorating remnants of the ceramic town (Fig. 6, Sec. 5 of the Tributary Zone--Sections of the Central Urban Division) of Firebrick. Most of the houses are still occupied, but the brick plants are unused and dilapidated. Great scars on the hillsides, where clay has been removed, and a railroad spur from the station of Firebrick on the valley floor, indicate its former significance.

Summary

The Central Urban Division, the second largest urban area of the Eastern Segment of the Middle Ohio Valley, is the product of the cultural occupance of the varied features of its natural environment. The broad valley bottom, and the less extensive terraces, on a great bend of the Ohio, on the outside of which the Scioto River in a wide preglacial valley breaks through the rugged surrounding uplands, are the dominant natural features. The Scioto Valley, traversed by railroads and highways and the unused remnant of a canal, is the major natural connecting link between the Middle Ohio Valley and Lake Erie. The commercial core of Portsmouth occupies the largest area of valley floor on the outside of the great bend of the Ohio at the mouth of the Scioto. This is the most accessible point of the Central Urban Division. Light manufactures, the outgrowth of commercial activities, surround the commercial core. Heavy manufactures, depending on water and rail transportation, as well as on the labor supply and the marketing facilities of the city, occupy the nearest

area of extensive valley floor. Westward from Portsmouth the Inner Zone of the Central Urban Division extends along the valley floor of the Ohio for about twenty miles on the Ohio side as a zone of general commercial agriculture. Along the valley bluffs, on the terraces, and in the tributary valleys is a subsistence residential area of part-time unskilled labor for the industrial area. Beyond the Tributary Zone is a sparsely populated rugged forested upland. Across the river on the narrow terraces of the Kentucky side is a small portion of the Inner Zone, at a point where traffic, especially from up the valley, crosses to the urban area on the other side of the river. Although the railroad does not cross there, both railroad and highway traffic do by means of the highway bridge and ferry. Thus the three districts of the division are very closely related to the features of a confluent site. The greatest advantage is the flat land in an area of steep slopes. The most costly disadvantage is the yearly menace of flood on the flat valley floor.

CHAPTER IV

EAST-CENTRAL RURAL DIVISION

Divisional Structure

The occupance of the East-Central Rural Division (Fig. 6) is composed of five parallel zones. They are the Inner Zone of commercial agriculture, two Tributary zones of a subsistence agriculture, and two Peripheral zones of subsistence agriculture, nemoriculture and saxiculture. The Inner Zone is the broad agricultural (Fig. 3) valley floor, paralleled along the valley bluffs and tributary valleys by the Tributary zones of subsistence agriculture, beyond which the subsistence culture of the Peripheral zones extends to indefinite limits in the dissected upland. The valley is wide (Fig. 4) and is enclosed by steep though low bluffs. Terraces are not numerous, although the broad upper level of a preglacial strath extends northward from the northern end of the division. A surfaced highway and a railroad (Fig. 3) traverse the valley bottom on each side of the river. The highway digresses in several places from the characteristic bluff-side to a mid-section and even riverfront position. On some of the wider sections of the valley floor are several longitudinal highways, and on most of them the characteristic bilateral pattern of farmsteads is well developed. Villages are spread throughout the area. Decadent little river hamlets are lacking, however, and only the agricultural market and railroad towns of Greenup and Riverton are of any significance.

Inner Zone of Commercial Agriculture

Five sections, three on the Kentucky side and two on the Ohio, constitute the Inner Zone of commercial agriculture. Each section is associated with a bend in the river. On the Kentucky side the Siloam Section is on the inside of the great bend at Sciotoville, followed by the Grays Branch Section on the inside of the next open bend, and the Greenup Section on the outside of an open bend on both sides of the mouth of the Little Sandy River.

On the Ohio side the Pine Creek and the Haverhill sections occupy the insides of two open bends.

Siloam Section

With the exception of the small western tip, the sharp convex crescent, the Siloam Section (Fig. 6, Sec. 1 of the Inner Zone--Sections of the East-Central Rural Division) on the inside of the northerly great bend of the Ohio (Fig. 3) is an area of general commercial agriculture. The section is asymmetrical, with the little agricultural village of Siloam on the bluff-side of the valley bottom about at the center of the section. Above the village the section tapers to a thin point between the river and the steep face of the bluff. Federal highway U.S. 23 rises and falls with the irregularities of the lower slopes of the bluff, whereas the Chesapeake and Ohio Railroad traverses a less devious and better-graded route on the valley floor below. Fields of corn completely utilize the narrowest portion, changing to a complete agricultural occupance of corn, small grain, hay, and pasture as the valley bottom widens towards the center of the great bend. Near the village of Siloam a branch of the Chesapeake and Ohio Railroad curves across the valley floor on an inclined grade, and crosses the Ohio on a bridge[1] to the valley of the Little Scioto, whereas the mainline continues in a direct course along the bluff-side of the valley bottom.

Westward from the village an agricultural occupance of high degree of intensity spreads over the deep alluvium of the wide valley bottom. The usual crop combinations of a general commercial agricultural economy are most extensive, followed closely by truck crops, pasture, and hay. Regularly spaced lanes, normal to the highway, cross the valley bottom from the highway to the riverfront. Along the highway, which follows the lower irregular edge of a terrace, are scattered the farmsteads, with no tendency to grouping in any particular portion of the area. The little village of Siloam, in which the raising of nursery stock and the selling of farm implements are the main activities, extends for

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[1]The Chesapeake and Ohio railroad bridge, built in 1917, is the second of the present bridges in the Eastern Segment of the Middle Ohio Valley. The first is the Norfolk and Western railroad bridge at Kenova, West Virginia, built in 1913.

about a quarter of a mile between the highway and the railroad along the longest lane.

Dissection is not a significant factor on the wide valley floor, for the major tributary (Fig. 4), Tygarts Creek, is incised in a straight course directly across the valley bottom at the western extremity of the area. Intermittent subsequent drainage has not been sufficient to develop a well-marked mid-section sag, which fact accounts in part for a regular pattern of farmsteads on the flat surface of the valley floor. Drainage is slow because of the lack of a well-developed mid-section sag, so that the fields and unsurfaced lanes tend to be muddy during periods of wet weather.

Grays Branch Section

The Grays Branch Section (Fig. 6, Sec. 2 of the Inner Zone--Sections of the East-Central Rural Division) the next five miles of the valley bottom commercial agricultural zone, is a symmetrical convex crescent about a mile wide, and is much like most of the other valley floor sections in its details of occupance. The railroad pursues a straight course from the lower to the upper end of the section slightly inside of the center, whereas the highway describes a more devious route between the railroad and the valley bluff. The usual bilateral pattern of farmsteads with their transverse lanes is characteristic, with highway sites in the majority since the road is well within the valley bottom.

Three stations are evenly distributed along the railroad in an area too small to support a well-developed commercial center. Short crossroads connect the stations with the highway. A navigation dam and locks (Fig. 3) are located near the southern end of the section.

Greenup Section

The Greenup Section (Fig. 6, Sec. 4 of the Inner Zone--Sections of the East-Central Rural Division), the last five miles of the Valley Bottom Zone of Commercial Agriculture on the Kentucky side, is divided into two almost equal parts (Fig. 3) by the Little Sandy River. The lower half is very narrow and is occupied (Fig. 3) by the railroad, the irregular valley bottom

highway, and a few scattered fields of crops belonging to the adjacent subsistence farms. Above the mouth of the Little Sandy the section widens to about a half mile and is the site of the agricultural market town and county seat of Greenup (Figs. 2 and 3), as well as the old railroad junction of Riverton. A few general farms fill in the corners left vacant by the towns.

The railroad, in characteristic manner, longitudinally divides the section. The area between the railroad and the river just above the mouth of the Little Sandy River is utilized by the compact portion of the town of Greenup. Beyond the railroad scattered village forms extend to the valley bluffs. Here again a completely developed and functioning agricultural river town preceded the railroad, which was not projected beyond Huntington, West Virginia until in the 1870's. In the case of Greenup, however, there was sufficient room and a desirable site for the railroad on the valley floor outside of the town.

The town pattern consists of four streets parallel with the Ohio between the Little Sandy River and a minor tributary. The third street from the river, the one utilized by the highway, is the commercial street. Residential and commercial forms, shaded by huge maple trees that meet over the street, occupy both ends of the town, whereas the usual commercial manifestations of an agricultural market center of about 1,000 population utilize the several central blocks. A side road from the Little Sandy valley intersects the highway about at the center of town and extends to the river, where a ferry crosses to the Ohio side. The public square, the court house, and other public buildings occupy the cross street from the highway to the river. Though old and somewhat decadent[1] the features of an agricultural market town are much in evidence. Like Vanceburg, Greenup has a public auction of livestock at regular intervals. Residences complete the rest of the compact portion of the town, and scattered houses and a few wholesale commercial establishments along the railroad complete the open portion of the pattern.

The highway turns sharply at the eastern edge of Greenup

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[1]Greenup, like many other towns faced with diminishing economic resources, has turned its position as a county seat, the laxity of the marriage laws of the state, and its nearness to other states with stricter laws, to its advantage. The subtle prominence given abodes and offices of those empowered to perform marriages indicate something of the significance of the activity.

to avoid the poorly-drained bottom of a tributary valley, and follows the railroad for a mile and a quarter through the village of Riverton. A second road along the bluff joins the highway at a point east of town where it crosses the railroad. A little cluster of buildings along the railroad and highway constitutes the village. The Eastern Kentucky Railroad at one time joined the Chesapeake and Ohio through a valley from the upland, and a short spur ended on the river bank. Both the spur to the river and the Eastern Kentucky Railroad have been abandoned, and with the exception of a small part of the line at the junction with the Chesapeake and Ohio now used for storage track, the rails have been removed. A subsequent intermittent tributary separates the town along the railroad from a row of attractive homes beneath large, spreading, shade trees on the riverfront. Eastward from the town to the end of the division, commercial agriculture occupies the valley floor between the railroad and the river.

Pine Creek Section

South of Wheelersburg Pine Creek Section (Fig. 6, Sec. 4 of the Inner Zone--Sections of the East-Central Rural Division), the smaller of the two sections which constitutes the Inner Zone of commercial agriculture (Fig. 3) on the Ohio side, extends upstream for about five miles.. Highway U.S. 52 leaves the eastern edge of the star-shaped town of Wheelersburg, and in the usual manner traces the outer edge of the valley bottom. In this case, however, the highway follows the eroded edge of a terrace about one hundred feet above the valley floor, for it is at this point that the preglacial strath (Fig. 4) separates from the present trough of the Ohio.

The Norfolk and Western Railroad, like the Chesapeake and Ohio on the opposite side of the river, follows a smooth grade well within the valley bottom. To avoid more than one crossing of the meanders of Pine Creek, which pursues a devious course down the lower end of the section, the railroad deviates from the shortest route. A side road from Wheelersburg extends diagonally across the valley bottom to the riverfront, which it follows for about a mile before turning back to join the highway.

General commercial agriculture of a medium degree of utilization is spread over the entire section. The bilaterally arranged farmsteads, especially well-developed in relation to the

roads on the inner and outer margins of the valley floor, carefully avoid the widest portion of the mid-section sag. The usual crops are grown in the Pine Creek bottom although tobacco is less prominent than it is in the Western Rural Division. Truck crops, however, are somewhat more extensive.

Haverhill Section

Above the Pine Creek Section the river swings towards the valley bluffs on the Kentucky side in an open bend twelve miles long, on the inside of which (Fig. 6, Sec. 5 of the Inner Zone--Sections of the East-Central Rural Division) is the wide Haverhill Section. General commercial agriculture (Fig. 3), most of which is of a high degree of utilization, dominates the section. Agricultural practices are quite similar, though the farms are larger than those of other valley bottom commercial agricultural areas due in part to the greater size of the Haverhill Section.

The railroad follows as short a route as possible along the level surface of the outer edge of the valley bottom. At Franklin Furnace at the northern end of the section, where the highway crosses the railroad (Fig. 3), and at Haverhill Station in the center of the area, there are short storage tracks. A long siding extends all of the way from the Ironton District into the southern end of the section. The highway describes a broad bend from the bluff-side at the northern end of the section to the riverfront in the center, and back again to the bluff-side at the southern end. The little village of Haverhill, with a population of less than one hundred, occupies the point on the riverfront directly opposite Greenup (Figs. 2 and 3), where the highway most closely approaches the river.

A secondary road, connected with the highway by three short crossroads, follows the foot of the valley bluff almost the entire length of the section. The bilateral pattern of farmsteads is most conspicuously developed. In general the land on the river side of the highway is an area of agriculture of a medium degree of utilization. There dissection is greatest, and as might be expected is attended by the greatest amount of forest and waste land.

Between the highway and the valley bluff is a large area of a high degree of productive utilization. Large farmsteads line the road along the valley bluff, most of them being there

rather than on the highway. A few are in the center of the valley floor on long lanes which cross the level valley bottom from one road to the other. Dissection is slight in this area, and large rectangular fields completely occupy the deep, well-drained alluvial soil.

Tributary Zones of Subsistence Economy

On both sides of the river the commercial agriculture of the valley bottom is bordered by Tributary zones (Fig. 6, Tributary Zone--Sections of the East-Central Rural Division) of subsistence agriculture (Fig. 3) and nemoriculture. Highways and railroads connect these subsistence areas, which are associated (Fig. 4) with the valley bluffs, the tributary valleys, and the terraces, with the market towns and villages of the valley bottom.

Kentucky District

On the Kentucky side of the valley, the Tributary Zone occupies (1) the steep, eastward-facing valley bluff in which are incised numerous short, youthful tributary valleys, (2) two mature tributary valleys, the Tygarts (Fig. 2) and Little Sandy, and (3) two small terraces.

Northern Section.--Adjacent to the Siloam Section of the valley bottom, on the inside of the northern great bend of the Ohio, is a tributary section of both subsistence and cash agriculture which occupies the flat-floored Tygarts Valley (Fig. 6. Sec. 1 of the Tributary Zone--Sections of the East-Central Rural Division) and a series of terraces (Fig. 6, Sec. 2 of the Tributary Zone--Sections of the East-Central Rural Division). The valley bottom highway crosses the outer edge of the lower terrace, which rises about fifty feet above the valley bottom and extends from the mouth of the Tygarts to the point of the bluff on the inside of the bend. Short lanes from the highway extend back into a general commercial (Fig. 3) agricultural area of medium productive utilization.

A hundred or more feet above the first terrace is a small area of subsistence farms of low degree of utilization which occupies the forested dissected surface (Fig. 4) of an old upper terrace. Subsistence farms occupy patches in the forest on the wide floor of the Tygarts Valley, in which the stream has in-

trenched its meanders to a depth of about fifty feet. A dirt road from the highway follows the outside of both sides of the valley along which the little farmsteads are strung, leaving most of the lower valley floor to floodplain forest.

Western Section.--From the inside of the great bend to the end of the division, the Western Section of the Tributary Zone of Subsistence Agriculture (Fig. 6, Sec. 3 of the Tributary Zone--Sections of the East-Central Rural Division) occupies the steep face of a three-hundred-foot valley bluff, which, for its inclination, has a relatively small amount of exposed rock. Since the narrow divide between the Tygarts and Ohio is only a mile wide at the narrowest point, short youthful valleys, many of which do not have permanent streams, descend the wall at fairly regular intervals. Each valley has its cabin or cluster of cabins, naïvely known as a town, especially if it happens to possess a post office or a store. Most of the flat space is taken up by squalid little cabins; patches of corn and tobacco ascend the steep face of the bluff as far as there is sufficient unconsolidated surface in which to plant. Above that second growth forest and brush extend to the summit. The Little Sandy River at Greenup is the only mature valley in the whole section. The main cross street at Greenup follows the higher land on the east side of the valley. Along it are subsistence farms; patches of floodplain corn and forest occupy the flat, frequently flooded floor of the valley.

Ohio District

With the exception of a small tapering edge of the preglacial strath, on which general commercial agriculture (Fig. 3) is practiced, a subsistence farm and forest economy is found on the steep valley bluffs of the Ohio side. Small subsistence farms follow a road along the outer margins of Pine Creek Valley (Fig. 6, Sec. 5 of the Tributary Zone--Sections of the East-Central Rural Division) in the north and along the narrow tributary valleys in the southern part of the district.

Peripheral Zones of Subsistence Economy

Beyond the Tributary zones of subsistence agriculture which occupy the valley walls and tributary valleys, extends the peripheral subsistence economy of the adjacent maturely dissected

upland. Agriculture, nemoriculture, and saxiculture are the three interrelated activities which center in the narrow valleys and intermittently occupy the steep slopes and discontinuous ridges of the upland. The agriculture is the same as that practiced in the subsistence Tributary zones of the valley bluffs and the mouths of the tributaries along the Ohio. The forest has been cut over several times. Little coal mines, locally known as truck mines, are worked by simple drift methods. In this hills district, as well as in the areas farther east, the relics of an earlier saxicultural and industrial activity are widely scattered. Small lodes of iron ore were widely mined and locally smelted by charcoal burned from the native supply of hardwood. Furnaces were moved or abandoned whenever a supply of either wood or iron ore was exhausted. Nothing remains today of this activity except slag heaps and the name "Furnace" attached to a few tiny subsistence villages in narrow valleys in the hills.

Summary

The East-Central Rural Division is an area in which divergent agricultural economies occupy contrasting natural environmental sites in a manner similar to the cultural-natural environmental relationships of the Western Rural Division of the Eastern Segment of the Middle Ohio Valley. General commercial agriculture, served both by railroads and highways, utilizes the well-drained, smooth, alluvial valley floor, whereas subsistence agriculture, nemoriculture, and saxiculture occupy the valley walls, terraces, and tributary valleys, and beyond similar subsistence economies spread out over the dissected upland as peripheral areas which finally lose all connections with the valley.

CHAPTER V

EASTERN URBAN DIVISION

Industrial and Commercial Economy of the Division

The Eastern Urban Division, the upper thirty miles of the Eastern Segment of the Middle Ohio Valley (Fig. 3), is dominated by urban patterns, forms, and functions. Industry and commerce characterize the economy, with cities, factories, and railroads dominating the landscape. Within the division lives a population of about 145,000, or over half of the total occupants of the entire Eastern Segment. Four cities and several small towns and villages contain most of the people. Above the Big Sandy is the city of Huntington (Fig. 2) and the towns of Ceredo and Kenova, West Virginia; below are the cities of Catlettsburg and Ashland, Kentucky, and several small towns and villages. On the Ohio side most of the population lives in the city of Ironton, but there also are several small towns and villages. Since all of the cities (Fig. 3) occupy the valley floor in places where the valley is little more than a mile wide (Fig. 4), their patterns, oriented with the riverfront, are long and narrow and in most instances have almost coalesced. From the eastern limit of Huntington, which includes the old village of Guyandot, it is possible to travel, with only minor interruptions, through about thirty miles of cities and towns. Because the cities and towns have developed on the floor, parts of all of them have been inundated by periodic floods.

The river is both a threat and an aid to the cities within its valley. The valley offers a level site, amid an area of hills, for the various urban forms and functions; and the river is a source of relatively inexpensive transportation but costly inundation. The river transportation of heavy, bulky materials, chiefly coal and coke, sand, gravel, clay, iron ore, and some partially fabricated iron and steel products, is a significant advantage, because of its relatively low cost, to the industries along its banks. Railroad transportation likewise is a signifi-

cant factor. Three divisions of the Chesapeake and Ohio, the Norfolk and Western, and the Baltimore and Ohio railroads (Fig. 2) enter the Eastern Urban Division from the southeast, east, and northeast and extend northwestward down the valley towards the southern Great Lakes.

The area lies in the Appalachian coal and natural gas field, a region rich with fuel resources. Although some of the cities are built upon the gas field, and, therefore, have wells within the city limits, pipelines are necessary to furnish a supply to most of the cities as well as to more remote districts. Coal is not mined in any amount within the immediate area, but it is shipped by short rail hauls from the commercially productive mines farther south.

The economy of the area, expressed in terms of large factories, industrial cities, railroads, highways, and barge lines, focuses on the valley floor, the Inner Zone of the division. In a manner characteristic of the pattern of the entire Eastern Segment of the Middle Ohio Valley, Tributary zones parallel both sides of the valley bottom along the valley walls, tributary valleys, and terraces. There the peripheral residential areas of cities, hamlets, subsistence (Fig. 3) and part-time farms prevail. Rural roads and transverse highways, at widely-spaced intervals, join the valley bottom corridor by way of tributary valleys. Beyond the Ohio Valley Peripheral zones of subsistence agriculture, nemoriculture, and saxiculture extend to indefinite limits on the dissected terrain of the Appalachian Upland.

Inner Zone of Urban Occupance

The Inner Zone of the Eastern Urban Division is composed of six well-defined and contrasting districts. Each in turn is the product of several closely articulated sections of specific functions. Although the Huntington District contains the largest city of the Eastern Segment, it is not the functional center of the division. It is, instead, one of the significant portions, perhaps the most important district of the Inner Zone, joined on the west by districts of lesser magnitude. Although the Ohio side of the valley, especially the Ironton District, had a higher degree of urban industrial development earlier than the others, a much greater development has taken place on the southern side. Both the Ashland and Huntington districts now far exceed the older

Ironton development. The zone consists of the six districts of Ironton, Russell, Ashland, Sheridan and Huntington.

Ironton District

On the Ohio side the Ironton District has reached and passed its climax. The towns of Hanging Rock and Coalgrove and the city of Ironton (Fig. 6, Secs. 1, 2, and 3 of the Inner Zone--Sections of the Eastern Urban Division) completely occupy the seven miles of narrow valley floor. Although large industries are in operation there today, the presence of a number of unoccupied plants and ruins of others give to the district an air of industrial decadence. Unlike the other cities, which have spread out on terraces and even on the dissected terrain of the neighboring uplands, the Ironton District has, for the most part, remained walled in on the narrow valley bottom. It is this condition that largely accounts for the severity there of the 1937 flood.

Hanging Rock Section.--The decadent village of Hanging Rock occupies the little wedge of valley floor (Figs. 3 and 4) at the lower end of the district. For about three-quarters of a mile the vertical valley walls rise abruptly above the narrow valley floor, occupied only by the highway and railroad, and separate the Hanging Rock Section from the East-Central Rural Division. The crumbling ruins of ceramic plants and iron foundries line the waterfront, whereas a few occupied houses, several stores, a little wooden church, and a log post office are scattered about at the foot of the bluff. A railroad spur in a narrow tributary valley taps the Lawrence clays[1] of the upland. These clays have been shipped to Cincinnati for many years for the manufacture of yellowware and stoneware. For about a mile farms and scattered houses line the highway between the village of Hanging Rock and the city of Ironton.

City of Ironton.--The city of Ironton occupies most of the valley floor for a distance of about four-and-one-half miles. The rectangular pattern of the city (Fig. 8) is oriented with reference to the river. Both the highway U.S. 52 and the Norfolk

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[1]Wilbur Stout, Myril C. Shaw, G. A. Bole, and Downs Schaaf, "The Lawrence Clays of Lawrence County," Geological Survey of Ohio, Fourth Series, Bulletin 36 (Columbus, Ohio, 1931), pp. 122-23.

and Western Railroad, follow a direct course through the city. The railroad occupies the waterfront, and the highway the first continuous street from the river. The Detroit, Toledo, and Ironton Railroad, which approaches Ironton from the north through a tributary valley, traverses the center of a street to the waterfront, where it there enters the yards of the Norfolk and Western Railroad. The railroad station, the wharf, the terminal of the Greene Line Steamers, a city park, and the city water pumping station occupy the waterfront near the railroad junction, whereas the highway bridge, built by the Ironton and Russell Bridge Company in 1922, crosses the river just above the railroad station. The state highway Ohio 75, the only transverse highway in the city, reaches the upland through a tunnel. A second road, at a higher elevation, is under construction to serve as a means of escape should there be a repetition of the severe flood of 1937.

Around the intersection of the highways and the railroads (Fig. 8) is the commercial core, which occupies about seven blocks along the first two streets from the river. The first street, on a slight ridge, is occupied by the older, more decadent building. Some buildings are empty and a few of them are partially destroyed. The next street is slightly lower and is the present center of the business district. Commerce and residences follow the valley bottom highway U.S. 52 most of the way through the city.

In back of the commercial core a completely built-up residential area extends almost to the valley bluff. The courthouse, post office, and city hall are immediately adjacent to the core, whereas schools and other social features, as well as isolated stores, are scattered through the residential areas. The upper portion contains much partially built-up residential area as well as vacant land, whereas a small, poor residential area occupies rough, unpaved streets on the lower valley slopes directly beyond the business core. At the lower end of the city is a small, compact, completely occupied residential area, beyond which is a section of scattered homes. Since the residential area first developed adjacent to the commercial core, and since recent urban development has been very slow, the outlying areas contain a great amount of partially occupied or vacant urban land.

On the valley slopes along the Norfolk and Western Railroad in the lower part of the city, and on the valley bluff beyond the commercial core, are poor residential areas on sites

above flood level. This apparent incongruous condition seems to be a stage in the development of most of the river bottom cities. As the city developed the extensive, flat bottom land near the commercial core was of greater value for residential purposes than the more remote, steep slopes of the valley sides. This is especially significant since severe floods are separated by intervals of time great enough for their existence not to have been considered a menace. The better old residential areas, therefore, in most valley bottom cities occupy minor ridges on the valley floor. These were first, the riverfront ridge, and next, the rise beyond the everpresent mid-section sag. A third step in the development is usually the expansion of the residential area to the uplands or to a higher terrace from which beautiful homes in landscaped gardens look down on the valley below. The latter depends upon a commercial and industrial development sufficiently great to support the additional residential area and a transportational system closely enough articulated with the rest of the urban district to join conveniently the residents of the less accessible upper area with the centers of their economic employment. Ironton has not reached and perhaps never will enter the stage of extensive residential expansion, for the advantages which contributed to the earlier development of industrial leadership in the Eastern Section of the Middle Ohio Valley have largely disappeared, and the city has entered a period of industrial decline.

The industrial character of Ironton has changed as well as declined, and with the change has come a reorientation of the industrial pattern. A remnant of the earlier industries for which the city is named and known--foundries, rolling mills, blast furnaces, and the like--form one area; the light machine shop industries constitute a second; and the newer industries comprise a third. The blast furnaces, foundries, and rolling mills, successors of the old charcoal furnaces of the neighboring hills country, occupied the riverfront on both sides of the terminal of the Detroit, Toledo, Ironton Railroad, by which they received their supply of iron ore from the Great Lakes district. A spur extends in both directions along the riverfront from the railroad terminal (Fig. 8). At the end of the lower spur a small area is occupied by a group of inactive steel plants, whereas at the end of the upper spur nothing remains but vacant riverfront sites of five once important furnaces. The original industries of the

city, therefore, utilized a riverfront position close to the commercial core of the city.

The present industrial area (Fig. 8) occupies the large open areas at the upper end of the city. The largest of the group of three industries is a solvay coke plant, which utilizes an extensive area between the Ohio and its diagonal tributary Ice Creek. Coal is unloaded mechanically from river barges and is conducted to the plant on the bluff-side of both the railroad and the highway by a railroad spur. At the foot of the bluff in the valley of Ice Creek are the other industrial plants. One is the Alpha Portland Cement Mill, and the other is a firebrick plant. Both utilize rock from the face of the bluff and are connected to the railroad on the riverfront by a spur line.

Between the old and the new industrial areas is a scattered area of manufactures (Fig. 8) associated with the railroad, its spurs, and the highway. In this group the manufactures are varied but are chiefly of three kinds: machine shop and foundry products of which the making of mining machinery and stoves are the two representative types, shoes and leather, and planing mill products. The last is the result of an industrial development in an agricultural area in which the products of the farm and forest became industrial raw material at the market center. Mining machinery and stoves are especially marketable in the subsistence agricultural and saxicultural districts of the adjacent hills country.

Coalgrove Section.--Above the corporate limits of Ironton at Ice Creek, the town of Coalgrove (Fig. 6, Sec. 3 of the Inner Zone--Sections of the Eastern Rural Division) occupies the narrow point of the valley bottom in a manner similar to that of Hanging Rock at the lower end of the district. The Norfolk and Western Railroad traverses the riverfront. Just inside of it the highway U.S. 52 forms the main street of the town, which extends back across the narrow valley floor along a series of short streets. At the upper end of the section is a ceramic industry occupying the narrow valley bottom between the valley bluff and the river. Several short spurs from the railroad serve the riverside plants, which manufacture firebrick, tile, and terra cotta. Clay is quarried on the bluff-side and is conducted to the plants over both the highway and the railroad by an overhead conveying system. Both rail and river transportation are available to ship the heavy

finished commodities, as well as to import coal.

Russell District

On the opposite side of the valley bottom is the Russell District, which like its Ohio counterpart is industrial. Small towns rather than a city, however, dominate the area. Both the highway and the Chesapeake and Ohio Railroad maintain a position along the bluff-side of the valley bottom. Since the industries are associated with the railroad rather than with the river, the riverfront is without manufacturing establishments. Instead there are farms of a medium degree of productivity raising tilled crops, pasture, and hay.

Wurtland Section.--On the two miles of valley bottom at the western extremity of the Eastern Urban Division is an area dominated by the manufacture of explosives. The decadent little village of Wurtland (Fig. 6, Sec. 4 of the Inner Zone--Sections of the Eastern Urban Division), surrounded by part-time farms, occupies a small part of the upper portion of the area, but the King Powder Company and E. I. DuPont de Nemours and Company, Incorporated, Grasselli Chemicals Department utilize most of the section. The land between the railroad and the highway, as well as a part of the upland beyond the highway, served by the railroad spur, belongs to the King Powder Company, whereas the DuPont holdings are chiefly between the railroad and the riverfront. Because of the dangerous nature of their operations, a position (Fig. 3) somewhat isolated from both towns and farmsteads is essential. Yet their locations on both the Chesapeake and Ohio Railroad and the Ohio River within the limits of an urban area on the edge of one of the large coal fields, where a large proportion of the peace-time explosives are consumed, are likewise distinct advantages.

Raceland Section.--Above Wurtland the valley bottom widens into the three mile Raceland Section (Fig. 6, Sec. 5 of the Inner Zone--Sections of the Eastern Urban Division). The highway crosses the dissected edge of the preglacial strath, which joins the Ohio Valley (Fig. 4) at this point, whereas the Chesapeake and Ohio Railroad traverses the smooth surface of the valley floor just below it. The riverfront portion of the valley bottom is an agricultural area, but the inner margin, adjacent to the railroad, is occupied by the extensive Russell Car Shops of the Chesapeake and

Ohio Railroad. Level space is an essential factor since the shops[1] and yards extend for three miles along the Chesapeake and Ohio right-of-way, with a width varying from 500 feet to a half mile. Beyond the shops and the yards are storage areas for railroad ties and other bulky materials. A railroad village of about 800 population occupies a small corner of the valley bottom between the railroad yards and the river. At the upper end of the section is the town of Raceland, so named for the abandoned race course nearby, on the margin of the old preglacial strath. The town occupies a valley bottom site on the highway between the railroad yards and the bluff, with a small area of new development on the upper terrace.

Russell Section.--Above Raceland the valley bottom narrows rapidly. The railroad switch yards, a continuation of the shop and storage area of the lower section, cover most of the level surface of the valley bottom, and the town of Russell (Fig. 6, Sec. 6 of the Inner Zone--Sections of the Eastern Urban Division) at the upper end of the railroad yards is crowded on a little rectangular point of the valley floor between the bluff and the river. A small area of industry occupies a part of the valley floor between the railroad yards and the town. Since railroad yards fill most of the valley bottom, the highway ascends the side of the valley bluff at Raceland and returns again to the valley floor at Russell through a short tributary valley. The highway traverses the principal street of the town, which is parallel to the river and diagonal to the railroad. Several short cross-streets extend from the bluff to the riverfront. A highway bridge, the oldest in the Eastern Segment, crosses to Ironton. Before the bridge was built a ferry plying from the end of the principal cross-street to the Ironton wharf was the only trans-Ohio connection.

The business center surrounds the intersection of the highway with the principal cross-street in the lower part of town. In fact the highway enters Russell on the cross-street and turns in the center of the business district. Residences utilize most of the rest of the valley bottom and even occupy the steep valley walls above the railroad. A long overpass conducts the highway over the railroad to the side of the bluff where it continues for

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[1] In keeping with the importance of coal as a commodity hauled by the Chesapeake and Ohio Railroad, hopper-bottom steel cars constitute the chief output of the shops.

a mile or more to the Ashland District. The railroad alone occupies the narrow strip of valley floor, whereas a single row of houses lines the bluff above the highway.

Ashland District

The nine miles of valley bottom from the end of the Russell Section to the mouth of the Big Sandy River constitutes the Ashland District. Unlike the adjacent district, and similar to the Ironton area across the Ohio, the Ashland District is completely urban, consisting entirely of the cities of Ashland and Catlettsburg (Fig. 6, Secs. 7 and 8 of the Inner Zone--Sections of the Eastern Urban Division). The valley bottom is very narrow there, not exceeding three-quarters of a mile in the widest place. City functions have recently gone over the valley walls and have spread out on the undulating surface of the preglacial strath (Figs. 3 and 4), which extends from the Ohio at the upper end of Ashland to the Ohio between Raceland and Wurtland.

Although both sections of the district are urban, Catlettsburg with a population just exceeding 5,000 is quite overshadowed by Ashland with a population six times as great. Catlettsburg, like Greenup and Vanceburg, is the county seat of a large county, most of which is dissected hills country. Ashland is an industrial city utilizing the coal, iron, natural gas, clay, rock, and hardwood forests of the neighboring districts.

City of Ashland.--The valley bottom portion of Ashland is long and narrow (Fig. 9) and is oriented with the river. The highway U.S. 23 enters the city from a grade on the side of the bluff and on a viaduct crosses the Chesapeake and Ohio Railroad, which utilizes the graded valley floor. Within the city the highway traverses the only continuous street to the corporate limits of Catlettsburg. At both extremes of the city the highway and the railroad follow each other closely, but in the central portion the railroad divides. One route parallels the riverfront and the other takes up a mid-section position. The Louisville and Lexington branch of the Chesapeake and Ohio system, the Ashland Coal and Iron Railroad, enters Ashland by the way of a tributary valley. At the western edge of the city this branch joins the Chesapeake Corridor, which has already received the Big Sandy Division at Catlettsburg. The only transverse highway, U.S. 60, follows the same general route, and joins the valley bottom highway U.S. 23

seven blocks east of the railroad. A highway bridge, opened in 1931 by the State Highway Department of Kentucky, crosses the Ohio a block west of the transverse highway.

The commercial core (Fig. 9) of the city occupies the area between the two branches of the railroad for eight blocks above the bridge along the second and third streets from the river. The newer and better retail stores, hotels, banks, and other accoutrements of the business center are arrayed on both sides of the third street for a distance of about seven blocks. The street is wide, and over its position on the highest ridge on the valley floor an air of well-being seems to maintain. Along the second street, which is considerably lower and nearer the river, the commercial features are older and less enterprising in appearance.

Surrounding the commercial core is a much larger zone of diverse cultural features, which utilizes most of the widest portion of the valley floor (Figs. 4 and 9). Above and below the commercial core are areas of both residence and commerce lining the three principal streets. The riverfront street is occupied in part by the railroad. Wholesale plants, as well as a few spots of poor residences, occupy the landward side of the street. The riverfront is narrowest at the bridge, and is filled with transportational and industrial features. Below the bridge, where the Louisville and Lexington branch joins the Chesapeake and Ohio Railroad, the narrow valley floor is completely covered by a railroad freight yards, freight sheds, and other storage equipment. Above the bridge railroad and river transportation meet, for there is the paved wharf, the terminal of the Greene Line Steamers, and the incline by which bulky commodities are loaded and unloaded.[1] The valley floor widens above the wharf, and small iron and steel plants, the Norton Iron Works and the Armco Sheet Mill, adequately served by both the railroad and the river, utilize a portion of the area. Most of the land is owned either by the American Rolling Mills Company, or the Chesapeake and Ohio Railroad, and is vacant. A railroad spur leading to the industries upstream, a

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[1]The wharf, like the railroad station and freight depots, is merely the general office for the whole district but makes no attempt to serve the heavy industries of the area. All of the industries on waterfront sites have their own wharfs, as well as railroad spurs, and are served directly by barge lines and railroad.

small improvised air field, and a few squatter shacks and patches of corn are the only cultural features.

Except for the wharves, the industries of the valley floor do not extend beyond the bank, which descends steeply for fifty or more feet to the river below. Willows and brush line the water's edge, and little houseboats, stranded high and dry and attended by rows of corn and vegetables, mark the temporary abode of a portion of the itinerant river population.

Along the terminal of the Louisville and Lexington Division of the Chesapeake and Ohio Railroad, extending from the valley bluff to the riverfront, is another area of railroads and manufacturing. Between the highway and the river, on both sides of the Louisville and Lexington Railroad and beyond the junction of the two railroad divisions, are several steel mills and firebrick plants, which are part of the American Rolling Mills Company. Between the highway and the bluff is the roundhouse and maintenance yards of the Louisville and Lexington Division of the Chesapeake and Ohio Railroad.

Most of the rest of the intermediate zone is residential, with spots of other types of occupance. Beyond the commercial core between the railroad and the valley wall is an area of fine residences. In the center of the district an area of twenty-four city blocks is occupied by Central Park, an attractive play grounds delightfully shaded by huge old trees of the original forest. Below the park and between the park and the bluff is the best residential area on the valley floor. The best streets occupy a low ridge which, like the area at the foot of the bluff, were above the level of the 1937 flood. Fine old homes in large shady gardens, a few of which include an entire block, characterize the residential occupance.

At the junction of the two branches of the Chesapeake and Ohio Railroad is the railroad station. A poor residential area, in which a portion of Ashland's negro population lives, fills in a little triangle beyond the railroad station. Along the railroad, beyond the average class residential area at the upper end of Central Park, are a few factories. A leather tanning plant and a planing-mill are the chief features here again emphasizing the significance of agricultural and forest products in the manufactures of the entire area.

The rest of the intermediate zone is a wedge-shaped resi-

dential area at the upper end of the city, between the valley bluff and the riverfront railroad yards at a point where the valley floor begins to narrow. Between the highway and the railroad in this area houses are poor, whereas the rest are middle class. Commercial features occupy the triangle between the railroad and the highway at the upper end of the area, as well as a cross-street once the route of a street car line on the slopes above the valley floor.

Enclosing the valley bottom core and intermediate zone is a broad, semi-circular periphery of scattered residences (Fig. 9) and industry which is associated with the dissected surface of the preglacial strath (Fig. 3) and with the narrow valley floor both above and below the heart of the city. On the narrow valley floor below the city limits is a portion of the periphery dominated by the main plant of the American Rolling Mills Company. Huge steel mills line the waterfront for a mile or more, whereas open parking space, athletic fields and the like extend from the mills to the railroad. An extensive switch system connects the mills to the railroad and with the smaller units of the Armco plants at the railroad junction. In this way coal and iron are delivered to the mills and steel products are removed. The river, too, is a significant feature, for bulky commodities are delivered by barge directly to the wharf at the mills, and heavy finished and semi-processed materials are shipped out in the same manner. A steamboat with a tow of barges loaded with heavy steel products is not an uncommon sight on the Middle Ohio.

At the upper end of the periphery the cultural occupance of the narrow valley bottom is a mixture of industry, commerce and poor residences. The city water works and the navigation locks and dam occupy a large area directly on the waterfront. The largest industrial plant is the Ashland Solvay Coke Company, which utilizes most of the valley floor between the water works and dam and railroad. Both river and railroad transportation serve the coke plant.

The rest of the riverfront is occupied by the old towns of Normal and Sandy City, which have been included in the corporate limits of Ashland. The old towns are poor residential areas between the railroad and the river, interspersed with industry and commerce in which lumber yards, oil tanks, and junk yards are characteristic. It is at Sandy City that the preglacial strath,

which encircles the Ashland and Russell districts, joins the Ohio Valley. Both the railroad and the highway follow the valley wall cut in the face of the strath, which lies a hundred or more feet above the valley floor. Along the highway is a row of residences, interrupted here and there by retail stores.

Above the valley bottom on the undulating surface of the strath is an area (Fig. 9) of scattered new homes, some of which are quite pretentious. In a tributary valley above the old towns of Normal and Sandy City is a somewhat larger and more irregular residential area of scattered houses. Although many of the buildings are new and prosperous in appearance, there is in general much that suggests a poor residential area. Near the highway the houses are close together and are crowded close upon the street, but up on the strath they are widely spread. Many of the residences are little subsistence farmsteads with small fields and a cow or two. Log or rough board shacks are sprinkled at odd angles over the wooded, steeper areas which have not been laid out in streets.

The largest part of the scattered residential periphery (Fig. 9) lies on the preglacial strath directly above the valley bottom core and intermediate zone. A narrow, steep ridge, with its steepest face toward the river, separates the intermediate and peripheral zones. The transverse highway U.S. 60 (Fig. 9) is the only through street in the area. Several small local shopping centers are scattered through the residential neighborhood. Irregular streets, many of which terminate in a circular court; widely-spaced houses, in most cases in little clusters; and much unused, steep, forested slope are the principal elements of the picturesque residential area.

Although a few areas are poor, especially those on the steeper slopes and in the scattered areas near the Louisville and Lexington Branch of the railroad, most of the zone consists of fine, new homes. The best area occupies the top of the ridge between the valley floor and the strath, from which vantage point it looks out over the entire valley.

The more completely developed areas, especially those with shopping centers, are small villages which have been incorporated as a part of the city. These villages developed on the strath, outside of the city at the intersections of major roads. One area still retains the original village name.

Beyond the city limits on the bluffs and dissected strath above the American Rolling Mills is a number of scattered residences, most of which are located on small, part-time farms and are occupied chiefly by steel mill employees. A better residential area surrounds the country club at the western edge of the peripheral zone.

Catlettsburg.--The valley walls close in on the Ohio at the southern corporate limit of Ashland, which also marks the end of the preglacial strath. From there to a point a mile and a half up the valley of the Big Sandy, the city of Catlettsburg (Fig. 6, Sec. 8 of the Inner Zone--Sections of the Eastern Urban Division) stretches out along the narrow valley floor. Vestiges of sawmilling and gristmilling indicate the earlier service center significance of the valley bottom town and county seat at the confluence of the Big Sandy and Ohio rivers.

Although its position as a rural service center is of little significance today, the value of its situation in certain respects still maintains in spite of disadvantageous site conditions. The Ohio Valley Division of the Chesapeake and Ohio Railroad crosses the Big Sandy at the southern edge of Catlettsburg, where it is joined by the Big Sandy Division, and from there follows the valley floor on the south side of the Ohio on its way to Cincinnati. Highways, following much the same route, similarly focus on Catlettsburg, and pipelines from the Big Sandy natural gas fields center in the city in somewhat the same manner.

Lack of extensive flat space is, perhaps, the greatest disadvantage of the city, since it is crowded on a narrow strip of valley floor between the steep valley wall and the river. Catlettsburg, with its small commercial center on the riverfront just below the mouth of the Big Sandy, is a residential and transportational center between two much larger industrial cities. With the relative advantage of available flat space, and with at least as advantageous locations, they have rapidly advanced upon it from both sides.

Sheridan District

On the opposite side of the river from Ashland is the Sheridan District (Fig. 6, Sec. 9 of the Inner Zone--Sections of the Eastern Urban Division), which extends from Coalgrove at the

upper (southern) extremity of the Ironton District to the narrow valley floor above North Kenova seven miles away.

Directly opposite the city of Ashland the valley bluffs rise abruptly above the river with barely space enough for the Norfolk and Western Railroad on the smooth surface of the valley floor and the highway on its rougher margin just above. The Ashland toll bridge (Fig. 9) crosses the Ohio in the lower portion of the two-mile strip of valley bluff, and as is true at other bridge heads, with the possible exception of the Ironton-Russell crossing, the usual working day group of parked cars is evidence of the bridge head trans-Ohio relationship.

The remaining five miles is a wide crescent on the inside of an open bend opposite the mouth of the Big Sandy and the preglacial strath (Fig. 4). The Norfolk and Western Railroad parallels the riverfront closely to North Kenova at the stream end of the section. There it curves abruptly against the valley wall just beyond the railroad yards and crosses the Ohio River (Fig. 3) to Kenova, West Virginia. The highway describes an irregular course through the section. In the downstream portion it follows the flat surface of the valley floor between the tributary creeks. In the upstream part, where it is joined by several short lanes and two roads from the upland, it occupies the higher part of the valley floor away from the mid-section sag.

Part-time farms (Fig. 3) are in the majority on the wide valley floor which is an area of a high degree of productive utilization. Field crops, hay and pasture predominate, with a small showing of truck and orchard crops. The farmsteads are evenly distributed and conform, in general to the highway and roads which, in turn, have utilized the higher portions of the valley floor. In the downstream portion of the district they are in the center of the area between the tributary creeks. In the upstream part the farmstead pattern is composed of three parallel parts. One portion is associated with the riverfront ridge, another with the mid-section ridge between the creeks, and the third with the higher land at the foot of the valley bluff.

Three villages, each of which is connected with the railroad and the river, complete the cultural occupance. Sheridan occupies the lower point of the crescent where the railroad most closely approaches the riverfront. Here a siding and an incline for the delivery of coal connects the river and the railroad.

South Point, on the riverfront directly opposite the mouth of the Big Sandy, is the place where a major pipeline, conducting gas from the Big Sandy field to cities farther north, crosses the Ohio River. Because the river is used for navigation this thirty-four-inch pipe is submerged. North Kenova, at the upper end of the crescent, is a railroad village at the end of the Norfolk and Western Railroad bridge over the Ohio.

Chesapeake District

From the railroad bridge at North Kenova to the mouth of Indian Guyan Creek nine and a half miles farther up the valley is the Chesapeake District (Fig. 6, Sec. 10 of the Inner Zone--Sections of the Eastern Urban Division) of part-time farms and villages. This area is dependent on the Huntington District across the Ohio River, and is connected to it by a toll bridge and several ferrys. Highway U.S. 52 follows an irregular course along the center of the crescent, except at the lower, narrower end, where it is on the riverfront. At Chesapeake it crosses to Huntington on the toll bridge. State highway Ohio 7 continues up the Ohio Valley from the bridge. No railroads traverse the Chesapeake District, since the three railroads in this general portion of the Ohio Valley all lie on the other side of the river.

Part-time farms (Fig. 3) dominate most of the downstream part of the district, which is an agricultural area of a high degree of productive utilization in which both field and truck crops, hay, and pasture predominate. Side roads from the upland center on the little agricultural and residential villages of Burlington and Sybene about midway of the district.

Above Sybene the valley floor narrows somewhat, and the part-time agriculture gives way to residences, an air port, and other features of significance to the urban district directly across the river. The residential bridge-town of Chesapeake occupies the upper end of the wide valley bottom. From there a narrow valley floor between the bluff and the river, traversed by a highway and occupied by attractive residential areas, extends the remaining two and a half miles up the valley.

East of Indian Guyan Creek (Fig. 7) there is a wide valley floor utilized for general commercial agriculture (Fig. 3); this is the beginning of another major segment of the Ohio Valley.

Huntington District

From the mouth of the Big Sandy to a point a mile above the mouth of the Guyandot River on the south side of the Ohio River, is the thirteen-mile-long Huntington District. Nine miles of the riverfront are occupied by the city of Huntington, West Virginia (Fig. 6, Sec. 11 of the Inner Zone--Sections of the Eastern Urban Division), and the rest by the towns of Ceredo and Kenova (Fig. 6, Sec. 12 of the Inner Zone--Sections of the Eastern Urban Division).

The city of Huntington owes its rapid growth and present size in part to its situation at the head of the Middle Ohio Valley, where the easiest and most direct natural routes from the Chesapeake Bay join the most direct natural approach to the southern Great Lakes. Since the valley floor site is long and narrow, the city has expanded both ways along the river and has climbed to the uplands in only a few of the most favorable places. In this longitudinal expansion, Huntington has included within its limits at least three other towns, Westmoreland, Central City, and the old historic village of Guyandot at the mouth of the Guyandot River.

The three railroads, the Chesapeake and Ohio, the Norfolk and Western, and the Baltimore and Ohio, which focus on the Huntington District from the southeast, northeast and the north and northwest, give to it the qualities of a railroad center. In 1871, at the time of the incorporation of the city, which is much later than that of other towns and cities in the Ohio Valley, the western terminus of the Chesapeake and Ohio Railroad was at Huntington. In fact the city was named for Collis P. Huntington who was at that time president of the railroad. It is because of its early railroad terminal position that the oldest and largest industries of the district are concerned directly with railroad equipment.

Commercial core.--Although Huntington, like all the other valley bottom cities, is elongated in pattern (Fig. 10), the commercial core is square and compact. It represents, in general, the business center of the original city, which was laid out on the highest ground at the widest place on the valley floor. The commercial area begins with the second street from the river and extends inland for three blocks. Longitudinally, the zone is

four blocks long, although it extends a block or so farther in both directions along two of the streets, both of which are the routes of state highways. Highway U.S. 52 enters the core from the Ohio side by way of the toll bridge and leaves the city for the south two blocks farther east. The usual array of retail stores, hotels, office buildings, banks, theatres, and city and county buildings, befitting a county seat and industrial city of 75,000 population, fill the urban core. Largest and most prominent of the office buildings are those devoted to railroad and mining interests.

Intermediate zone.--On the valley floor, approximately between Four Pole Creek (Fig. 10) and the Guyandot River, is an extensive elongated intermediate zone which completely encircles the commercial core. In keeping with the transportational personality of Huntington, railroads are conspicuous features here. The Chesapeake and Ohio Railroad, which follows the old James River-Kanawa route from Norfolk, enters the urban district on the valley floor on the north side of the Guyandot River. At the point where the Guyandot breaks through the valley wall of the Ohio the railroad crosses to the Ohio Valley, and thence follows a straight mid-section course on a right-of-way along the southern limit of the early city. At the western limit of the original city the railroad curves towards the face of the bluff, reaching it at the point where Four Pole Creek enters the valley trough. From there to Kenova, at the crossing of the Big Sandy River, it follows the outer margin of the valley floor.

The Ohio Valley Division of the Baltimore and Ohio Railroad crosses the Guyandot River in the southern edge of the old village of Guyandot, having followed the valley floor of the upper Ohio from the north (Fig. 10). About eight blocks below the Guyandot River, the railroad turns abruptly towards the riverfront, which it follows to the western limit of the old city, whence it takes a mid-section position to the terminal at Kenova.

A belt line of the Chesapeake and Ohio Railroad parallels the riverfront outside of the Baltimore and Ohio tracks for a distance of twenty-three blocks. In the western part of the area, originally Central City, a spur track of both railroads extends to the industrial plants on the riverfront.

Within and around the railroad belt line is a part of the intermediate zone, corresponding closely to the original city,

that encloses and is inseparably related to the commercial core. In fact the commercial core is joined on the south by several blocks of both stores and residences which extend to the main line of the Chesapeake and Ohio Railroad. The passenger station occupies the center of the area, and in both directions from it on both sides of the railroad are wholesale plants, with here and there small factories and poor residences.

Both residences and retail stores extend upstream and downstream from the commercial core along the two principal streets. The transverse highways, originally car lines, in the eastern portion of the area are also commercial streets. Marshall College covers several blocks in the eastern part, and the rest of the area south of the riverfront railroad yards is occupied by four separate residential areas of medium quality.

The riverfront, especially the east end (Fig. 10), is a long, narrow area of diversified industrial and wholesale activities. The industries, the oldest in the urban district, occupy the wide eastern portion of the riverfront on both the Chesapeake and Ohio Railroad; these shops date from the time when Huntington was the western terminal of the railroad.

Mintern Homes Corporation, manufacturers of prefabricated houses, which occupies the narrower western end (Fig. 10) of the belt line industrial area, together with the other twenty or more smaller woodworking industries in the Huntington District, are indicative of the significance of the forested uplands nearby.

Between the two large industrial extremities are a miscellaneous group of industries, including stove manufacturing, mattress making, railroad warehouses, and the river wharf and warehouses. Heavy industries and wholesale establishments, served by both railroad freight belt lines, utilize the flat land of the riverfront adjacent to the commercial core of the city.

Directly south of the belt line of the valley floor between the Chesapeake and Ohio Railroad and the bluff is a completely built-up residential area (Fig. 10), interrupted here and there by a sprinkling of other functions. Three fairly evenly spaced highways cross the area from the uplands to the commercial center of the city. Because of the underpasses at the railroad these streets are the main arteries from the outer residential areas to the commercial core since few other streets cross the railroad. Commercial activities are intermittently scattered along

the state highway, and wholesale activities and residences are lined up on the south side of the Chesapeake and Ohio Railroad in the eastern part of the area.

The western part of the residential area between the railroad and the bluff is the site of attractive homes. Churches and schools are scattered through it, and in the narrow valley of Four Pole Creek, which follows the foot of the bluff, a boulevard winds through a wooded park. Although not poor, the houses of the eastern part of the residential area are smaller and less attractive than those in the western end. A greater amount of commercial activities and a sprinkling of industry add a heavier note to the eastern portion. The West Virginia Brick Company, occupying an area of about two blocks at the edge of the bluff, is the most conspicuous non-residential feature in the eastern part.

Between the Guyandot River and the industrial eastern portion of the railroad belt line (Fig. 10), on the inside of a small open bend of the Ohio, is a residential area of middle-class houses, occupying most of the land except the waterfront and that adjacent to the railroad. The western part of the waterfront, which is separated from the American Car and Foundry Company by a few blocks of poor residences, is an area of wholesale activities. Coal yards and the only tobacco warehouse in the Eastern Section of the Middle Ohio Valley outside of Maysville, Kentucky, are the cultural features of importance. The eastern portion of the waterfront is twenty or more feet higher than the adjacent valley floor and is the site of large, attractive homes, some of which have beautifully landscaped gardens overlooking the Ohio River. At an altitude of 560 or more feet, this area, like a portion of the central part of Huntington, was above the 1937 flood, which reached an altitude of 559.6 feet at the dam at the western end of the city. The southern side of the area adjacent to the Baltimore and Ohio Railroad is vacant.

Just above the mouth of the Guyandot River on the valley floor between the Baltimore and Ohio Railroad and the Ohio River, is the old town of Guyandot (Fig. 10) at the point where the historic James River-Kanawa trail joined the Ohio. Two through streets, one of which is state highway W. Va. 62, cross the Guyandot River and continue eastward up the valley bottom of the Ohio. The principal cross-street, the second street from the Guyandot

River, begins at the edge of the valley floor above the Ohio and continues up the south side of the Guyandot Valley as highway U.S. 60, crossing the river at the eastern corporate limit. At the intersection of the two highways are a few blocks of commercial activities, typical of the business center of a small town, whereas the rest of the cultural occupance is residential. Near the commercial center in the older portion of town the houses are older though generally not inferior to those in the newer eastern portion. On the waterfront at the corporation line, which is the farthest point upstream in the Huntington District, the pumping station of the city water works occupies a position characteristic of most such plants in Ohio River cities.

West of the railroad belt line (Fig. 10), on a part of the valley floor low enough to be inundated in the 1937 flood, is a portion of the intermediate zone which was originally the independent town of Central City. A commercial nucleus, about in the center of the area, surrounds the intersection of the valley bottom highway and the principal cross-street. The Baltimore and Ohio Railroad extends the entire length of the area about at its center, whereas the Chesapeake and Ohio Railroad cuts diagonally across the southern margin. Spur tracks from both lines extend to the riverfront about at the mid-point. The area is thus divided into four unequal portions by the railroad pattern; each portion is dominated by middle-class residences. The residential occupance is complete except for the southeastern and southwestern corners of the two southern quarters in which scattered residences prevail.

Amid the residential matrix in the Central City is a sprinkling of industrial and commercial activities, the largest single area of which is on the waterfront. There, at the end of the railroad spur, is a veneer wood factory and a glass brick plant, with nearby a large sand and gravel company. Each one reflects the advantageous use of a local raw commodity, available cheap fuel, or inexpensive bulk transportation. A golf course, a baseball park, and a tourist camp occupy portions of the riverfront above and below the industrial area. The rest is vacant except for the usual fringe of willows and brush.

Along the railroad lines in the center of the Central City are diversified groups of manufacturing establishments (Fig. 10), most of which are small. Wood and glass products predominate, al-

though paint, machinery, concrete blocks, ice, beer, and overalls are among the output of the small factories. The Owens-Illinois Glass Plant and the American Thermos Bottle Company on the Chesapeake and Ohio Railroad at the southern edge of the area are two of the larger plants. In fact, the glass plant is the largest industrial establishment in the western portion of the city. The woodworking plants, chiefly along the railroad spur, are small and produce a variety of commodities ranging from wooden boxes and frames to caskets.

Periphery.--Encircling the areas of complete occupance in Huntington, is a periphery of widely spaced and scattered cultural features, which extend (Fig. 10) from the Ohio River at the western limits of the city to the hills and upper terraces south of the city and across the Guyandot River to the Ohio above the city limits. The periphery is the product of five extensive and quite contrasting areas, all of newer development. Although scattered residences of all qualities dominate the occupance, industry and various kinds of institutions claim large blocks.

The first area on the valley floor at the western end of the periphery west of the lower end of Four Pole Creek (Fig. 10) is the town of Westmoreland which is now a part of Huntington. Scattered middle-class residences occupy the greater part of the area, most of which were inundated in the 1937 flood. Along the highway at the eastern end of Westmoreland are a few completely built-up blocks of residences, at both extremities of which are small areas of commerce. The riverfront and the valleys of Four Pole Creek are vacant. Along the Chesapeake and Ohio Railroad on the southern edge of the area, near Four Pole Creek, are several small industrial plants, which produce machinery, glass, and food products.

The second area on the forested upland south of Westmoreland is a residential portion of the periphery. Scattered residences in a partially developed residential area follow a devious course up a narrow tributary valley to a country club on the ridge tops. Nearby is the United States Veterans Hospital. Another partially developed subdivision encloses the southern side of the country club, whereas a third extends from the valley floor up another short tributary valley.

The third area on the uplands above Four Pole Creek (Fig. 10) is a residential portion of the periphery. In the valley of

Four Pole Creek, which flanks the bluff, and on the adjacent uplands is a series of landscaped parks. Winding drives, along which the largest and most attractive homes of the city are intermittently sprinkled in a natural woodland setting, connect the area with the downtown. The greater part of the area, especially the best residential portion, occupies the relatively flat-topped part of the upland. This area is close to and directly connected with the business section of the city, yet is removed from both the industrial areas and the flood danger of the valley floor.

The fourth area of the periphery occupies the dissected surface of the preglacial strath (Figs. 4 and 10) and the adjacent uplands between Four Pole Creek and the Guyandot River. Highway U.S. 60 extends from the valley floor of the Ohio across the strath to the valley of the Guyandot River. On a level portion of the strath at the site of an earlier village is a completely developed residential area through which the highway passes. Elsewhere are scattered residential areas and unoccupied real estate developments in which rough graded streets have been laid out in the woodland. Most of the residential areas are of middle class, with here and there a superior portion. Some are poor, especially the one on the edge of the bluff along the railroad overlooking the shops of the Chesapeake and Ohio Railroad. The Huntington State Hospital overlooks the valley floor of the Ohio from a site on the outer edge of the strath, whereas three large cemeteries occupy level sites in its middle part. On the little triangle of upland between the preglacial strath, the Ohio Valley and the Guyandot Valley is the reservoir for the water supply of the city.

The fifth area of the Huntington periphery occupies the upland and the valley floor between the Baltimore and Ohio Railroad (Fig. 10) and the inside of the great bend of the Guyandot River. The dominant feature of the area is a branch plant of the International Nickle Company, which occupies a large area on the valley bottom at the bend of the Guyandot River. Monel metal is made there. The industry enjoys a number of relative advantages, among which inexpensive fuel and available space in an especially accessible situation on the periphery of the city of Huntington are important ones.

A few blocks of scattered small houses in an undeveloped real estate subdivision, chiefly the homes of employees in the

monel plant, extend along the widest part of the valley of the Guyandot River. On the uplands a scattered residential area overlooks the Baltimore and Ohio Railroad. Just beyond the city limits on the Chesapeake and Ohio Railroad is the Alexander Kerr and Company glass plant, with a small residential area just above it on the bluffs. The rest of the area is vacant or is subsistence farm land, except for a few scattered residences on the valley floor of the Ohio just beyond the corporate limits, and an undeveloped real estate subdivision on the bluffs above it.

Kenova-Ceredo extra-peripheral zone.--West from the city limits of Huntington to the mouth of the Big Sandy River, the Ohio Valley floor is occupied, with the exception of a small area of farm land in the sag of Twelve Pole Creek, by the towns of Ceredo and Kenova (Fig. 6, Sec. 12 of the Inner Zone--Sections of the Eastern Urban Division). Ceredo (1,164 population) which is the smaller of the two, gives evidence of having been a river town that has lost most of its earlier functions and is now a passive residential area under the economic domination of larger urban areas. Kenova (population 3,680), on the other hand, between Ceredo and the Big Sandy, displays occupance features similar to those of Huntington. The three railroads--the Chesapeake and Ohio, the Baltimore and Ohio, and the Norfolk and Western--enter the town and completely enclose it in a rectangular belt line much like that of Huntington. The Baltimore and Ohio Railroad terminates at Kenova, but the Chesapeake and Ohio crosses the Big Sandy to Catlettsburg. The Norfolk and Western enters Kenova by way of the Twelve Pole Valley (Fig. 2) to the roundhouse and railroad yards on the south side of the valley bottom, where it crosses the river to North Kenova, Ohio.

Small commercial centers occupy the cores of both Ceredo and Kenova, whereas wholesale commercial activities, especially sand and gravel, and wood industries dominate the waterfront. In Kenova industrial activities are notably outstanding. Gristmilling, sawmilling, and the making of veneer wood and boxes are characteristic of the town and its waterfront. An oil refinery, a creosoting plant, a cement mill, a glass factory, a concrete pipe plant, and an insulator works, all of which depend on bulky river transported raw materials and cheap fuel, dominate the valley floor of the Ohio at the mouth of the Big Sandy.

Tributary and Peripheral Uplands

Beyond the valley bottom on both sides of the river are Tributary zones of part-time and subsistence agriculture, associated with the dissected uplands, tributary valleys, and portions of a preglacial strath (Figs. 3 and 4). At Ashland and Huntington the urban functions of the valley bottom, which constitute the economies of the Inner Zone, spread over the valley bluffs to the preglacial strath and uplands. Throughout most of the division, however, sharp contrasts distinguish the Tributary and Inner zones.

Most of the Tributary Zone is covered with secondary deciduous forest, and little subsistence hills farms occupy the narrow valleys, whereas part-time farms utilize lower slopes of the bluffs and the strath. Wide tributary valleys in which general commercial farming is carried on are not as characteristic as they are in other divisions, the Big Sandy Valley (Fig. 6, Sec. 2 of the Tributary Zone--Sections of the Eastern Urban Division) being the only large tributary. On some of the more advantageously situated slopes and bluff-tops above the Ohio River, especially adjacent to the Huntington District, orchards are characteristic of the part-time agricultural economy. Saxiculture adds a new note to the quality of the Tributary and Peripheral zones. Clay is taken from the valley bluffs along the Ohio, and coal is mined extensively in the hills chiefly from small pits. The important West Virginia coal fields, however, are only about one hundred miles south of the Ohio Valley, and supply most of the coal used in the industries in the Eastern Segment. Natural gas, petroleum, rock, and clay all are important local raw materials. Iron, once so significant in the hills, is now exhausted.

In a few places outside of the urban districts residences have taken advantage of the higher, relatively flat, surface of the strath. Between the villages of Wurtland and Raceland a residential development of nice homes has taken place amid the little part-time farms of that area. Likewise, an almost continuous row of part-time farm houses and two villages occupy the road which extends from the narrow valley wall and across the strath (Fig. 6, Sec. 1 of the Tributary Zone--Sections of the Eastern Urban Division). With distance the intermediate nature of the tributary hills changes to a Peripheral Zone of subsistence agriculture,

nemoriculture and saxiculture, which finally loses all connection with the Ohio Valley.

Summary

Urban forms and functions, the largest and most important of the Eastern Segment of the Middle Ohio Valley, occupy the flat valley floor. In several places, especially in the larger cities, urban forms and functions have spread to the valley slopes, the preglacial strath, and the upland. The valley floor is especially significant to the urban districts, in spite of the menace of flood, for it is the only flat land, in an area of maturely dissected hills, sufficiently extensive for urban development. Roads and railroads follow the valley, not only because of the easy grades along the valley bottom, but because this route lies in a direct line between Chesapeake Bay and the southern Great Lakes. Through the very center of the urban division flows the Ohio River, the most used navigable river in the country. Industries, chiefly iron and steel, glass, ceramics, concrete, coal products, chemicals, and lumber, dominate the economic activities of the cities, for the raw ingredients on which they are developed are available at no great distance from the valley bottom. Likewise, markets for these commodities are advantageously situated.

All of the cities have the same general elongated pattern, with the commercial center near but not on the waterfront, at the point where the chief transverse highway intersects the valley bottom highway. Although the railroads tend to follow the foot of the bluff, they also encircle the cities with belt lines which serves both riverfront and interior industrial and commercial areas. The waterfront commercial street in most cities is old and is in transition from commercial to industrial or even poor residential uses. Residential districts of varying degrees of quality spread out over the valley floor from the commercial centers. In those cities where growth has been great enough, residential areas have expanded to the terraces and hills above the valley bottoms. Part-time farms occupy large areas of the valley floor, as well as the valley slopes and the preglacial strath, especially near the cities. Part-time farms supply a significant proportion of the labor in the steel mills, chemical plants, and railroad shops and yards on the valley floor.

Beyond the urbanized valley bottoms are Intermediate and

Peripheral zones of subsistence agriculture, nemoriculture, and saxiculture, associated with the steep valley walls, and preglacial strath, and the adjacent maturely dissected, forested upland.

CHAPTER VI

CONCLUSIONS

The presentation of the "Occupance of the Eastern Segment of the Middle Ohio Valley" represents the results of a field investigation of a stretch of about 100 miles, comprising between 1,500 and 2,000 square miles, of one of the most important river valleys in America. Photographs, notes, and maps, based upon a unit land-use method of observation, were prepared in the field. From these data the findings were organized and presented.

Since the problem was one of interpreting the human use of the area under consideration, the cultural features were deemed of prime importance (Fig. 3). The significant cultural features consist of the cities, towns, and villages, the areas of commercial agriculture, part-time agriculture, subsistence agriculture and nemoriculture, industrial areas, mines, transportational features, such as railroads, highways, air ports, and navigation locks and dams, and other less extensive features, such as public and social institutions. Of all the elements of the natural environment to which the cultural features are related, land forms seem to be the most significant to the occupance of the area under consideration. These forms, consisting of the valley floor of the Ohio, valley bluffs, terraces, mature tributary valleys, youthful tributary valleys, portions of a preglacial strath, gently rolling uplands, and maturely dissected uplands, are shown on a map, Figure 4. The areal distribution of significant cultural features--retail, wholesale, residential, scattered residential, industrial, public, and vacant--for each of the cities of Portsmouth, Ironton, Ashland, and Huntington is presented on the maps, Figures 7, 8, 9, and 10.

The occupance of the area under consideration, the upstream part of the northwesterly-trending middle portion of the Ohio Valley, logically consists of five lateral zones of culture, cut across by four major population divisions, as expressed on the map, Figure 6. The five zones consist of an Inner or Middle Zone, two Tributary zones, and two Peripheral zones. The Inner

Zone lies on the valley bottom, the Tributary zones occupy the valley bluffs and the tributary valleys, the Peripheral zones lie beyond the Tributary zones on the dissected uplands. Commercial and subsistence economies form the basis of zonal delimitation; population distribution furnishes the basis of the four divisions. In two parts of the Eastern Segment of the Middle Ohio Valley urban population exceeds rural, whereas in two others the opposite is true. The four divisions of the valley are the Western Rural Division, the Central Urban Division, the East-Central Rural Division, and the Eastern Urban Division.

Details of the occupance of the entire area are presented in the preceding chapters--first the area as a whole, and then each division separately. Photographs, illustrating the characteristic types of agriculture of the area, are presented in Figure 11, as are some of the corridor qualities of the valley in Figure 12, and some urban occupance types in Figure 13. As a logical result of the foregoing presentation definite conclusions may be advanced, some of which throw light on the problems of the area, especially those concerned with land-use.

In part because of its situation the valley trough is an important route of rail, highway, and river transportation. A nine-foot channel, under the direction of the Army Engineers, Department of War, is maintained at times of low water by a series of dams and locks. Railroads, whose chief freight is coal from the West Virginia fields, and state and national highways, traverse the valley floor on each side of the river except on the north side of the valley westward from the Scioto River. The Middle Ohio Valley, however, is not a link in a more extensive corridor which includes the entire Ohio Valley. It is, rather, a smoothly-graded portion of a direct southeast-northwest route between Chesapeake Bay and the southern Great Lakes, traversed by the Chesapeake and Ohio and the Norfolk and Western railroads.

In part because of site conditions, it is significant to note that the occupance of the Eastern Segment of the Middle Ohio Valley centers on the valley floor, where a commercial economy dominates. This occupance consists of industrial and commercial cities and towns, general commercial farms, part-time farms, farm villages, and market towns. The commercial economy of the valley floor penetrates a hill country whose declining economy is based on subsistence agriculture, nemoriculture, and saxiculture.

The cultural occupance of the valley bottom consists of two types, urban and rural, upon associations of which the four major divisions of the Eastern Segment are based. The two rural divisions have long since reached a climax in their development and have become somewhat depopulated, as is indicated by the static old market towns and the decadent river villages and hamlets, yet they cannot be considered mature in the sense of complete or best type of land utilization. The urban divisions, in contrast, with the exception of the Ironton District, are still rather rapidly increasing in population. In both urban and rural districts the unsolved problems of floods, water supply, sewage disposal and stream pollution, soil erosion, and deforestation are evidences of immaturity in occupance. On the other hand, the system of navigation dams and locks in the Ohio, the building of flood walls and flood escapes in the most flood-devastated districts, the increasing use of the dissected upland for recreation and forest reserves, and the decline of certain types of manufacturing in parts of the area are evidences of approaching occupance maturity measured in terms of wise use of site and situation endowments.

Although quite different in the character of land-use, the same site advantages of level space, and the same situation quality of accessibility, apply to both urban and rural districts on the valley floor. Also the extremely disadvantageous condition of being hemmed in by the steep valley walls in a relatively narrow valley, subject to winter and spring floods of varying degree of severity, is likewise applicable. In weighing the advantages of the valley floor for permanent land-use against the disadvantages, it would seem that the ever present danger of loss and destruction by flood would entirely outweigh the advantages of level land, alluvial soil, and accessibility. This is not the case, however, for in the rural divisions the farms on the valley floor are much more prosperous than their subsistence neighbors on the hills above the flood level. Since many of the bluff-side farmsteads, as well as those in the tributary valleys, depend on the valley bottom highways, most of them are isolated though not inundated during severe floods. This condition is due to the fact that their only route of transportation, the valley bottom highway, is likewise inundated.

A better adjustment probably could be made in the agri-

cultural lands at a cost, however, that might not be justified. If the ownership of parcels of land were exchanged between the valley bluffs and the valley bottoms, and all of the farmsteads were moved to the lower slopes of the valley bluffs, together with the reallocation and necessary grading of highways and railroads, all critical cultural features would be permanently above flood level, and the valley bottom could be used entirely for tilled crops, pasture, and hay. This type of adjustment has already been worked out in the major tributary valleys, especially in their lower courses, where the floodplain is considerably lower than the valley floor of the Ohio.

Rural villages and hamlets differ with variations in site conditions and the status of their economic functions. A number of small decadent river towns would entirely disappear with a reallocation of farmsteads, for most of these towns are now nothing more than a group of farm houses. In their places would appear an almost continuous string of bluff-side farmsteads among which the few remaining commercial services could still be maintained.

Most of the larger agricultural towns and villages no longer have a connection of real importance with the river. Since most of them occupy narrow strips of the valley floor either at the mouths of tributary valleys or on terraces, it would not be an impossible task, although probably not an economically justifiable or even possible one, to move the endangered portions of the towns to unoccupied higher levels. Of course level space would have to be sacrificed for flood protection. Narrow winding streets on relatively steep slopes would be less convenient than straight ones on the valley floor. Portions of Maysville, however, have utilized the valley bluffs successfully for years, and the newer residential areas of some of the larger cities are successfully and attractively using the valley bluffs, and even the adjacent upland.

In the several urban divisions the utilization of site and situation qualities is quite different. Unlike the agricultural areas where the cultural occupance of the flat, well-drained, alluvial valley floor has no real connection with the river, the cities, through water supply, sewage disposal, and navigation are as definitely related to the river as they are to the valley floor. A reorientation, which would destroy their relation with the river, would, in a large measure, destroy important

advantages of site by which the cities have grown and developed. Since all of the cities are industrial and since most of the heavy industries are on the riverfront, the reorientation of areas within the individual cities might be a worthwhile readjustment.

In most of the cities the better residential areas are on terraces and on the valley bluffs at levels above any possible flood. It is the poor residential areas and the commercial and industrial areas that are most endangered by flood. Some of the poorer residential areas, especially those near the riverfront, together with decadent portions of the waterfront commercial areas, might be removed to bluff-side sites. This might be accomplished by state or local flood zoning regulations. The area left vacant along the riverfront might become the site of an earthen levee extending the entire length of each urban district from bluff to bluff at both extremes. Such an embankment would have to be twenty-five or thirty feet high in order to be of any protection in the event of a flood comparable to the one of January, 1937. Most of the cities have short sections of concrete levees, especially at the wharves, rising only a few feet above the level of the valley bottom. At the present time a flood wall is under construction at Ironton, Ohio at an estimated cost to the Federal Government of $1,900,000.

In a few instances individuals have instituted a practice that might well be more generally adopted, of raising buildings on high foundations. In the commercial core and other parts of the cities, which occupy minor rises on the valley floor and are therefore somewhat less endangered, this practice should be advantageous. In fact considerable filling and raising of both buildings and streets in various parts of the urban districts would give adequate flood protection except from the severe floods which fortunately come infrequently.

Another problem rising out of the urban occupance of the valley bottom is the question of an adequate supply of unpolluted water. All of the cities have had to face this problem in the past and all of them will have to face it increasingly in the future. The pollution is due to the fact that all of the cities draw their water supply from the river, usually at the upper corporate limit, and return untreated or only partially treated sewage to the river somewhere near the lower limit, and to the further fact that the industrial use of the water in some cases pol-

lutes the river. Consequently conditions become more serious as time goes on, especially downstream. Although pollution is severe during flood times when great quantities of foreign material are swept into the river, periods of low water, especially during the summer, also are times of serious pollution. At that time water is held slack behind the navigation dams, and the volume of sewage increases in proportion to the volume of water to receive and dilute it.

The Tributary and Peripheral zones of the valley walls and adjacent hills country have long since reached a cultural climax, and depopulation has been in progress for some time. Deforestation and consequent erosion of the steep slopes are serious disadvantages. For this reason more and more eroded slopes might well be added to the state forests, game preserves, and recreational areas.

The flat floors of the mature tributary valleys are strips of subsistence agriculture amid steep slopes, chiefly by virtue of their flat surfaces and alluvial soil, and as such have long since reached a climax. Roads and farmsteads cling to the valley slopes above the floodplain, since they flood more frequently than the Ohio. Because the mature tributary valleys are important contributors to the Ohio Valley floods, well-forested watersheds and some system of flood control, at least in the larger tributaries, would be to the advantage of the inhabitants of both the Ohio Valley and its tributaries.

The tributary valleys really are key features to the flood problem of the Ohio, for little can be done in the major valley with any real security obtained until some means of checking the volume of flood waters from the tributary valleys has been worked out. More than one method of cnecking the flood discharge of the tributaries is available. The method adopted for each and every valley should be the one best adjusted to the site and situation conditions of each tributary individually. With the flood discharge of the tributary valleys and the immediate runoff of the Ohio Valley properly controlled, the flood problem of the major valley would be reduced to a point where the reallocation of cultural features and the building of flood walls, as suggested above, would be sufficient protection against any future flood for the general cash agriculture and the industrial and commercial cities of the valley bottom.

Although not a problem in the sense of a direct maladjustment to natural environmental conditions, yet just as truly an evidence of the immaturity of the economy of the whole area, is the status of manufacturing upon which the prosperity of the urban districts is largely based. The decadence and almost total disappearance of sawmilling, gristmilling, and local brick plants, in which the output of the farm and forest was processed largely for a local market, indicate the passing of a pioneer economy. With the development of blast furnaces, rolling mills, coke plants, fire brick plants, shoe factories, and the like, attuned chiefly to an economy of extra-regional markets and sources of material, the economy of the area had advanced well toward its climax.

Maturity expressed in terms of stable economies, of necessity includes some measure of advantage inherent within the area by means of which the various economic activities are maintained. Industries designed to meet more than a local need sharply reflect the maturity of the area. Thus the decline of certain types of industries, chiefly blast furnaces, in the Ironton District, the migration of other industries, notably shoe factories from the Ironton and Portsmouth districts, and the compensating increase of rolling mills, chemical plants, and glass works in the Ashland and Huntington districts, are evidences of stabilizing readjustments indicative of approaching maturity.

Inexpensive river transportation is probably the most enduring advantage of the Eastern Segment, and a skilled, dependable labor supply is no doubt a second important advantage. Indigenous raw materials, fuel, and power are not significant conditions in the industrial development. Natural gas, clay, and sand are the only materials originating within the area. The exhaustion of iron ore and fuel, and the prohibitive cost of importing bulky raw materials in competition with more favorably situated districts, is largely responsible for the decadence of both the charcoal and blast furnace industries of the Ironton District.

The present day industries are based chiefly on materials brought in from other areas, and are thus products of advantageous situation and a dependable labor supply, and as such are probably indicative of the beginning of economic stability which may or may not be a climax economy in terms of the greatest number of people on the highest standard of living.

For the area as a whole probably the climax economy is still to come, but for certain districts it has passed, which is another indication of the shift of certain centers of industry within the area. The past twenty-five years have seen the decline and almost complete disappearance of blast furnaces in the Ironton District, and the rise of rolling mills, chemical plants, nonferrous plants, and glass factories in the Ashland and Huntington districts across the river. Cement mills, coke plants, and ceramic plants are the only industries that have remained fixed in the urban districts. The Portsmouth District, detached as it is from the cities of the Eastern Urban Division, seems to reflect neither increase nor decadence sharply, yet the extensive use of scrap iron in the steel mills of New Boston, and the recent migration of one of the large Portsmouth shoe companies to the Hocking Valley, possibly indicates the passing of the industrial climax there.

A further evidence of the stabilizing of the areal economy that has developed with the automobile and improved highways is the part-time farm. Therein lies the possibility of strengthening the economies of both the rural and urban districts, and thereby improving the general quality of the area as a whole. Marginal farm land can be put to use by a portion, at least, of the unskilled industrial labor that, because of the intermittent nature of their employment, ordinarily occupy poor residential areas and are a source of a number of the problems of an urban district.

Thus the essential geographic concept of the Eastern Segment of the Middle Ohio Valley as here presented is one of areal occupance in which a valley floor Inner Zone, consisting of two urban and two rural commercial divisions, and two Tributary and Peripheral zones of subsistence agriculture and nemoriculture of the valley walls and dissected uplands, are the essential components. What the future occupance of the Eastern Segment of the Middle Ohio Valley may be depends upon the wisdom with which man utilizes the flat floors, steep walls, terraces, tributary valleys, dissected uplands, and the river itself.

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